7 READY-TO-RUN PROGRAMS ON DISK INSIDE!

COMPUTE!'s PC MAGAZINE

FOR IBM, TANDY, & PC COMPATIBLES

02703

March 1989

HIGH-OCTANE COMPUTING!

More RAM
More Power
More Speed

- Basic Guide to PC Memory Expansion
- 83 Hot Boards! Which Should You Buy?

PLUS!

Turbocharge Your Dot-Matrix Printer! Get Laser Quality For $180...or less!

SOFTWARE ON DISK

ARCADE VOLLEYBALL
Electrifying on-court action for one or two players (256K & color monitor)

SPIN 'N' PRINT
Print spreadsheets—or any text file—sideways (256K, dot-matrix printer, & color monitor)

HDTEST
Tune up your hard disk for world-class performance (180K & any monitor)

CRIBBAGE
Master the game of kings and queens (256K & any monitor)

FIXBEEP
Give your speaker a music lesson (256K & any monitor)

COLORSET
Choose your own screen palette (256K & color monitor)

ERA
No more zapping the wrong file (256K & any monitor)

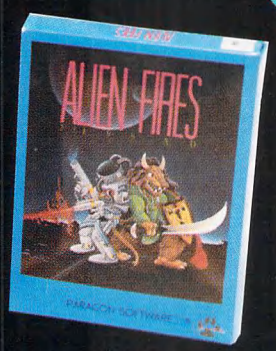
USA $12.95 Canada $17.95

03

0 71486 02703 4

Fantastic Voyages

INTO YOUR IMAGINATION



Travel With Paragon Software To A New World Of Entertainment Excellence

■ Fantasy lovers will delight in **Wizard Wars,** a creative graphics adventure featuring a brave tale of gallant heroism and wicked villainy set in the imaginative kingdom of Nhagardia. You assume the role of the Wizard Temeres on his noble quest to stop the evil designs of the power mad sorcerer Aldorin. Over 50 magical creatures to meet and 85 enchanted objects to collect.

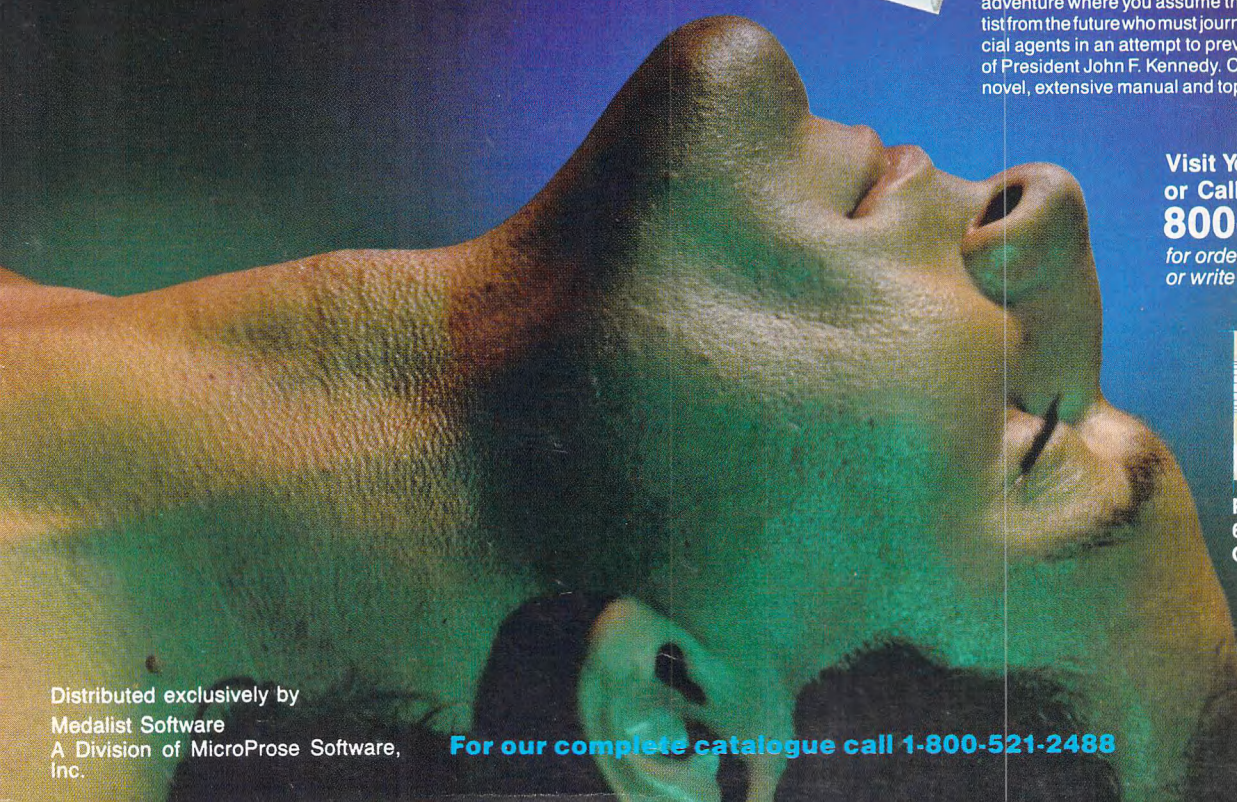
■ Arcade Gamers will love the challenging battles of **Master Ninja: Shadow Warrior of Death,** an action-packed martial arts simulation set in the ancient land of Japan and featuring over 25 combat screens, 20 martial arts moves, historic ninja weapons, hidden traps, mystic priests and deadly animals.

■ Adventure lovers will enjoy **Twilight's Ransom,** a graphic/text tale of love, danger, crime and international intrigue set in the precarious atmosphere of a big city. It's a race against time to save the woman you love.

■ Role players will be challenged by **Alien Fires - 2199 A.D.,** a futuristic science fiction game placing you in the role of a Time Lord sent to a distant planet to find an insane genius and his Galaxy threatening invention.

NEW!

■ For the strategist, Paragon Software presents **Guardians of Infinity: To Save Kennedy,** a complex strategy/text adventure where you assume the role of a time travel scientist from the future who must journey back in time with five special agents in an attempt to prevent the 1963 assassination of President John F. Kennedy. Complete with a background novel, extensive manual and top secret slide show diskette.



Visit Your Nearest Retailer or Call TOLL FREE

800-645-8632

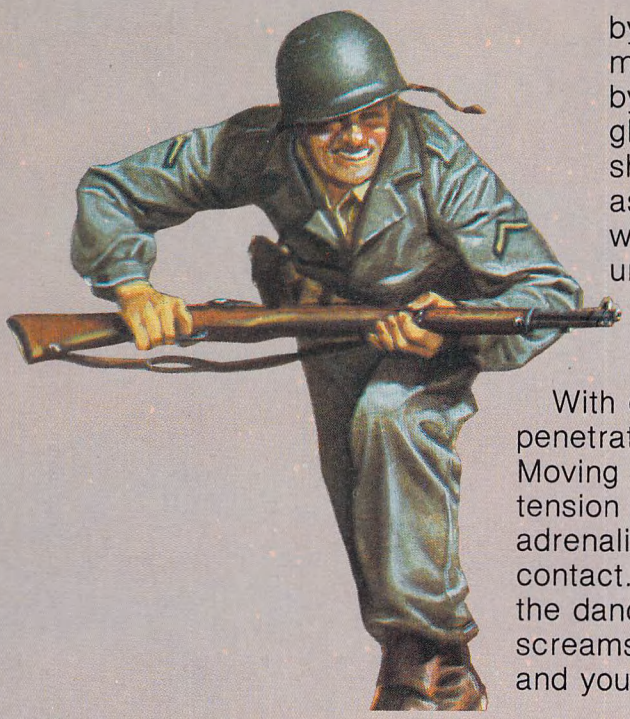
for ordering information or write to

PARAGON SOFTWARE

Paragon Software Corp.
600 Rugh Street
Greensburg, PA 15601

Distributed exclusively by
Medalist Software
A Division of MicroProse Software, Inc.

For our complete catalogue call 1-800-521-2488

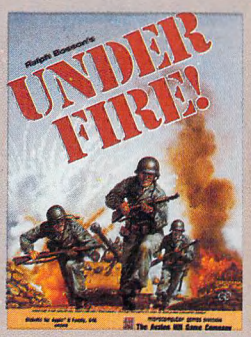


A peaceful morning is ripped asunder by the staccato thunder of an enemy machine gun. In the distance, shrouded by the morning mists, you catch fitful glimpses of enemy activity as you shoulder your weapon and begin another assault. Another dive into the unknown, where death waits to harvest the unwary, the unlucky and the damned.

With experience and skill your forces penetrate the dangerously silent village. Moving forward, nerves on fire with tension while your body soaks up adrenalin like a sponge, you await contact. Soon you find the enemy, the dance has begun. Some Joe screams INCOMING, dives for cover and you are

UNDER FIRE!®

...the state of the art simulation of company level combat in World War II. With infantry, tanks and various support weapons, your forces, be they German, Russian, British or American, face the enemy in a realistic simulation of one of the many small unit skirmishes that ended the Nazi terror and forged today's world.



A-5

The Avalon Hill Game Company
4517 Harford Road, Baltimore, MD 21214

Please send the items checked below to:

NAME _____

STREET _____

CITY _____

STATE _____ ZIP _____

Account # _____ Exp. Date _____

Signature _____

(Postage and handling, add 10% US, 20% Canada, 30% Foreign)

☐ Check Enclosed ☐ Money Order ☐ Charge
☐ American Express ☐ VISA ☐ MasterCard

UNDER FIRE GAME
☐ Apple II @ 59.95 (includes MAPMAKER DISK)
☐ Commodore @ 34.95
☐ IBM @ 34.95 **NEW** (CGB & 256K required)

*MAPMAKER DISK
☐ Commodore @ 25.00
☐ IBM @ 25.00

*EXTENDED UNITS DISKS
☐ #1 (Apple) @ 25.00
☐ #2 (Apple) @ 25.00

*UNDER FIRE GAME is required to play.

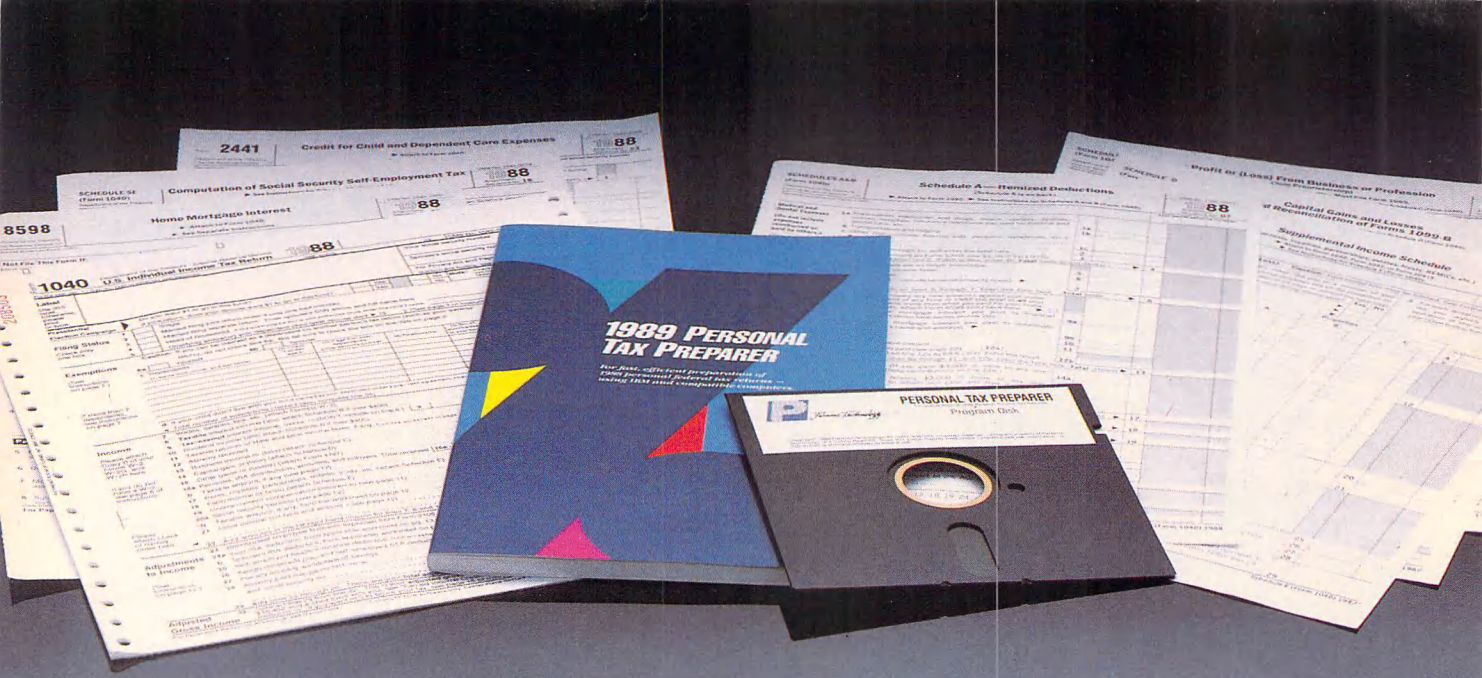
AVAILABLE SEPARATELY...

★ **MAPMAKER DISK** (wargame construction set!) With the Mapmaker Disk, **UNDER FIRE** is also a true wargame construction set. With the eight terrain types and over 60 pieces, it's possible to create the dense forest of the Ardennes, or the built-up cities of Stalingrad or Berlin.

★ **Extended Units Disks**
#1 Add armies and vehicles
#2 Build companies and battalions

Available at leading game and computer stores...or call TOLL FREE **1-800-638-9292**. Ask for Operator A-5.

microcomputer games DIVISION
The Avalon Hill Game Company
A MONARCH AVALON, INC. COMPANY
4517 Harford Road, Baltimore, MD 21214



THE $29 TAX RETURN SOLUTION.

Here's the solution to your 1988 personal federal income tax return. Prepare it yourself with this easy-to-use CPA designed program. Let PERSONAL TAX PREPARER'S "on-line" help, plus easy-to-follow menus and screens guide you every step of the way through your 1988 federal tax return.

The 1989 PERSONAL TAX PREPARER will calculate and print your 1988 federal income tax return including: Form 1040, Schedules A, B, C, D, E, R, SE, and more.

It also features:

- "What-if" processor — Change any information and instantly see the effect on your tax situation.
- Pop-up "on-line" help windows that provide explanations, relevant IRS Publication numbers and toll free IRS Tele Tax numbers.
- Three "IRS Approved" pin feed 1040 forms.
- A pop-up arithmetic calculator.
- A pop-up note pad.
- A financial calculator that figures interest rates, loan payments, balloon payments, loan balances, interest earned, savings and investment future values.
- Prints amortization and accumulation schedules.
- A 1989 Tax Planner.
- **Not copy protected.**

Parsons Technology

375 Collins Road N.E.
Cedar Rapids, Iowa 52402

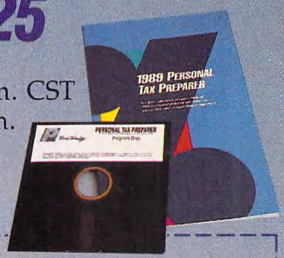
Whether you do your own return, want to check on your tax preparer, or, would like to plan your 1989 tax situation, Personal Tax Preparer is for you.

For Same Day Shipping

VISA, MASTERCARD, & C.O.D. ORDERS CALL

1-800-223-6925

(In Canada, call 319/395-7300)
Weekdays 8:30 a.m. to 9:00 p.m. CST
Saturdays 9:00 a.m. to 5:00 p.m.
Or send check or money order payable to Parsons Technology.



Parsons Technology

Dept. CPC
375 Collins Road NE
Cedar Rapids, Iowa 52402

1989 PERSONAL TAX PREPARER
$29 + $5 shipping
NOT COPY PROTECTED
INCLUDES PRINTED MANUAL

NAME _____

ADDRESS _____

CITY _____

STATE/ZIP _____ PHONE _____

CHECK ☐ MONEY ORDER ☐ VISA ☐ MASTERCARD ☐

CARD # _____ EXP. DATE _____

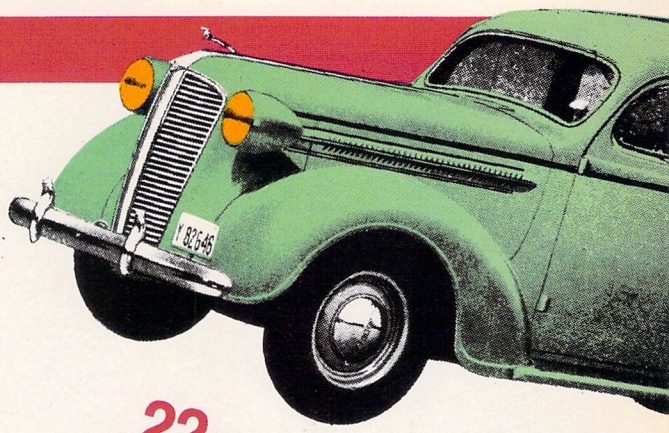
1989 PERSONAL TAX PREPARER requires an IBM or compatible computer, 256K or more RAM, DOS 2.0 or higher, 2 disk drives (or a hard disk). Add $5 shipping/handling — $10 outside North America. Iowa residents, please add 4% sales tax.

CONTENTS

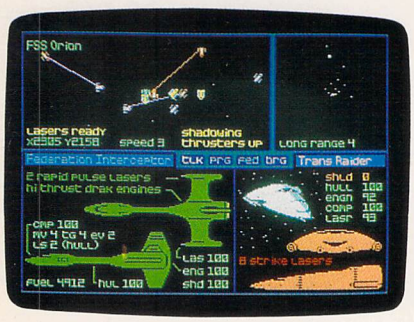
March 1989 Issue 10 Vol. 3, No. 2

Features

Laser Power from Your Dot-Matrix Printer
George Campbell 22
Grammar Checkers Battle It Out
David English 30
RAM Charge! How to Expand Your PC's Memory
Tom Campbell 35
Buyer's Guide to Expanded Memory Boards
Caroline Hanlon 39



22 Rev up your printer.



60 Visit a galaxy far, far away.

Departments

The Editor's View
Clifton Karnes 5
Reader's Feedback
Editors and Readers 6
Getting Down to Business
Robert A. Moskowitz 9
PC News & Notes
Arlan R. Levitan & the Editors . 11
IntroDOS
Tony Roberts 17
Power Programming
Tom Campbell 18
How to Use the Disk 54
New Products 78

Reviews

Sentinel Worlds I
James V. Trunzo 60
File Rescue Plus
John Shadle 61
ThinkTank
Neil Randall 62
***Flight Simulator* 3.0**
Ervin Bobo 63
Deluxe Paint II
John Foust 65
John Elway's Quarterback
Mickey McLean 67
Falcon AT
Ervin Bobo 68
***WordStar Professional*, Release 5.0**
Bob Gingher 69
PRD+ (Productivity Plus)
Clifton Karnes 71
Learning DOS
Ervin Bobo 72
Print Power* and *Sesame Street Print Kit
Thomas Cox 74
MindViewer
Ervin Bobo 75

Software on Disk

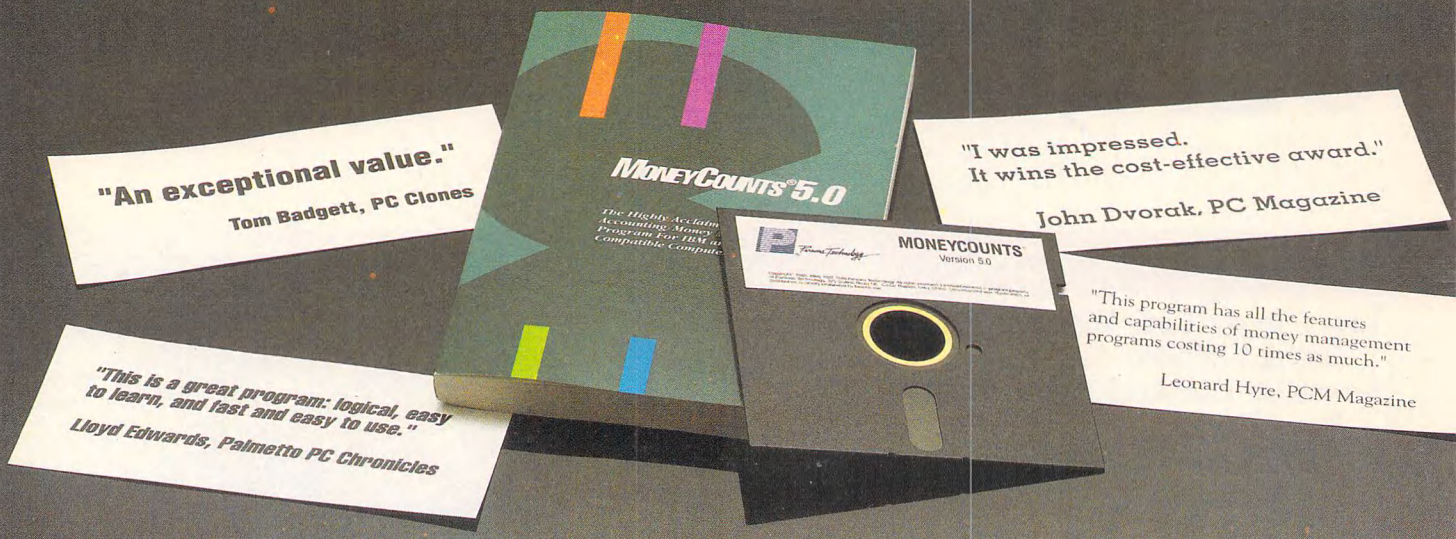
Best of the Boards
George Campbell 50
Arcade Volleyball
Rhett Anderson and David Hensley, Jr. 56
Spin 'n' Print
John Klein 58

9 Say *no* to hard disk disaster.

Cover photo © 1988 Mark Wagoner

COMPUTE!'s PC Magazine (ISSN 0893-8261) is published bimonthly by COMPUTE! Publications, Inc., ABC Consumer Magazines, Inc., Chilton Company, one of the ABC Publishing Companies, a part of Capital Cities/ABC, Inc. Editorial Offices are located at 324 West Wendover Avenue, Greensboro, NC 27408. Domestic Subscriptions: 6 issues, $59.95. **POSTMASTER: Send address changes to: COMPUTE!'s PC Magazine**, P.O. Box 10767, Des Moines, IA 50340. Second class postage paid at New York, NY and additional mailing offices. Entire contents copyright ©1989 by COMPUTE! Publications, Inc. All rights reserved.

THE $29 MONEY MANAGEMENT SOLUTION.


"An exceptional value."
Tom Badgett, PC Clones
MONEYCOUNTS 5.0
"I was impressed.
It wins the cost-effective award."
John Dvorak, PC Magazine
MONEYCOUNTS
Version 5.0
"This program has all the features and capabilities of money management programs costing 10 times as much."
Leonard Hyre, PCM Magazine
"This is a great program: logical, easy to learn, and fast and easy to use."
Lloyd Edwards, Palmetto PC Chronicles

GUARANTEED.

If you're looking for a complete money management/accounting program that offers outstanding value, we invite you to examine the evidence on MONEYCOUNTS.® ***It's the clear choice for home and business.***

MONEYCOUNTS is CPA designed, easy to use, menu-driven with on-line help, and requires no accounting experience. You'll appreciate the ease with which MONEYCOUNTS 5.0. . . .

- Manages your cash, checking, savings, & credit cards
- Prepares your budget
- Balances your checkbook
- Prints 5 types of financial statements (including net worth)
- Prints 6 types of inquiry reports
- Prints any type of pin-feed check & updates your records automatically
- Prints general ledger & accountant's trial balance
- Handles up to 999 accounts & 100,000 transactions a year with its fast financial data base
- Estimates your 1988 personal income tax
- Analyzes financing options & savings programs — computes interest rates & loan payments — prints amortization and accumulation schedules
- Manages mail lists — zip and alpha sorts — prints labels and index cards
- Displays and prints three-dimensional graphics — works with monochrome or color monitors
- Provides password protection, fiscal year support, pop-up notepad, and much more!

Parsons Technology®

375 Collins Road N.E.
Cedar Rapids, Iowa 52402

Hard to believe the low price? Don't worry! There's no catch. MONEYCOUNTS has a proven track record, has been on the market over four years, and is continuously receiving rave reviews. ***If you're not 100% satisfied, return MONEYCOUNTS within 30 days for a full refund*** (excluding shipping). Over 50,000 users have decided in favor of MONEYCOUNTS! Order today and judge for yourself!

For Same Day Shipping
VISA, MASTERCARD & C.O.D. ORDERS CALL

1-800-223-6925

(In Canada, call 319/395-7300)
Weekdays 8:30 a.m. to 9:00 p.m. CST
Saturdays 9:00 a.m. to 5:00 p.m.
Or send check or money order payable to Parsons Technology.

Parsons Technology®
Dept. CPC
375 Collins Road NE
Cedar Rapids, Iowa 52402

MONEYCOUNTS®
Version 5.0
$29 + $5 shipping
NOT COPY PROTECTED
INCLUDES PRINTED MANUAL

NAME _____

ADDRESS _____

CITY _____

STATE/ZIP _____ PHONE _____

CHECK ☐ MONEY ORDER ☐ VISA ☐ MASTERCARD ☐

CARD # _____ EXP. DATE _____

MONEYCOUNTS 5.0 requires an IBM or compatible computer, 256K or more RAM, DOS 2.0 or higher, 2 disk drives (or a hard disk). Add $5 shipping/handling — $10 outside North America. Iowa residents, please add 4% sales tax.

THE EDITOR'S VIEW

The secret's out. The latest circulation figures show that *COMPUTE!'s PC Magazine* is growing by leaps and bounds. We're pleased that you've responded so positively to the changes we've made in the last few months, and we think you'll enjoy the ones we're planning. We're determined to give you the most with our double-barreled, magazine-and-disk strategy.

This issue's disk—one of our best yet—has something for everyone. For game fans, we have two excellent offerings—"Arcade Volleyball," an action-filled commercial-quality sports game that will fascinate you for hours, and *Cribbage*, the favorite card game of kings and queens in an easy-to-learn version for the PC.

For those with hard disks, or those planning to buy one, there's Jim Bracking's *HDtest*. This program combines an impressive battery of diagnostics and utilities in one neatly wrapped menu-driven package. And the program's documentation is a good introduction to just what makes a hard disk tick.

Utility lovers will be pleased to find three DOS must-haves on this issue's disk: *ERA*, an erase program that saves you from erasing the wrong file; *FixBeep*, a clever TSR that controls the pitch and duration of the PC's speaker; and *ColorSet*, a handy set of programs that gives you complete control of your PC's foreground and background screen colors.

If you like to wring every bit of productivity out of your system, you won't want to miss "Spin 'n' Print," also on this issue's disk. It takes a spreadsheet or any text file, spins it around, and prints it sideways. We found this program's technique so interesting that we've included the complete BASIC source code on the disk, too.

This issue's magazine boasts an exciting lineup of features to help you get the most from your system. If you own a dot-matrix printer and have considered upgrading to a laser or 24-pin printer (and perhaps spending $2,000 or more), you won't want to miss George Campbell's "Laser Power from Your Dot-Matrix Printer." You'll be amazed to find out that there's a sleek thoroughbred hiding inside your 9-pin workhorse.

Almost every PC user would like to have more RAM, but the PC's memory scheme is notoriously complicated. Options include conventional, expanded, and extended memory, and there are several different (and competing) ways to use this memory—EMS 3.2, EMS 4.0, and EEMS. If you've been confused by the PC's complex memory structure, "RAM Charge: How to Expand Your PC's Memory" will have you talking like an expert in no time.

Since "RAM Charge" may inspire you to expand your PC's memory, we've included "Buyer's Guide to Expanded Memory Boards," which lists over 80 boards that offer expanded, as well as conventional and extended, memory. Caroline Hanlon and the staff have worked to make this the best, most complete listing of expanded memory boards available.

From the dynamic RAM chips that constitute computer memory, we move to the rarefied atmosphere of artificial intelligence, or AI. AI is something we're hearing more and more about these days, but it's also something most of us think of as remote from our daily computing. Until recently that was so, but now we're starting to see programs for the PC that make use of AI techniques. One of the frontiers of AI engineering is grammar checking, and in this issue two top grammar checkers go head to head. Whether you're specifically interested in grammar-checking software or not, we're sure you'll enjoy "Grammar Checkers Battle It Out."

Of course, no issue of *COMPUTE!'s PC Magazine* would be complete without our usual complement of columns that keep you up-to-date on the latest PC news and products, give you an insider's look at the BBS scene, help you get more from DOS, show you useful programming techniques, and provide a business perspective on PC computing. And last on the menu, we top this issue off with a collection of first-rate product reviews.

We're excited about this issue of *COMPUTE!'s PC Magazine*, and we hope our enthusiasm is contagious. One thing's for sure: If you like what you see in this issue, you'll want to stay tuned—we plan to get even better.

Clifton Karnes

Clifton Karnes
Associate Editor

The COMPUTE! subscriber list is made available to carefully screened organizations with a product or service which may be of interest to our readers. If you prefer not to receive such mailings, please send an exact copy of your subscription label to: COMPUTE!, P.O. Box 10955, Des Moines, IA 50950. Include a note indicating your preference to receive only your subscription.

Authors of manuscripts warrant that all materials submitted to COMPUTE! are original materials with full ownership rights resident in said authors. By submitting articles to COMPUTE!, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of COMPUTE! Publications, Inc. No portion of this magazine may be reproduced in any form without written permission from the publisher. Entire contents copyright © 1988 COMPUTE! Publications, Inc. Rights to programs developed and submitted by authors are explained in our author contract. Unsolicited materials not accepted for publication in COMPUTE! will be returned if author provides a self-addressed, stamped envelope. Programs (on tape or disk) must accompany each submission. Printed listings are optional, but helpful. Articles should be furnished as typed copy (upper- and lowercase, please) with double spacing. Each page of your article should bear the title of the article, the date and the name of the author. COMPUTE! assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE!.

COMPUTE!'s PC MAGAZINE
FOR IBM, TANDY, & PC COMPATIBLES

Editor **Lance Elko**
Senior Art Director **Janice R. Fary**
Associate Editor **Clifton Karnes**
Features Editor **Keith Ferrell**
Technical Editor **Patrick Parrish**
Assistant Editor **David English**
Senior Program Designer **Tim Midkiff**
Assistant Technical Editor **Jim Fuchs**
Contributing Editors **George Campbell, Tom Campbell, Arlan R. Levitan, Robert A. Moskowitz, Tony Roberts**
Assistant Editor, Submissions & Disk Products **David Hensley**
Editorial Assistant **Mickey McLean**
Copy Editors **Karen Siepak, Tammie Taylor, Karen Uhlendorf**
Programming Assistant **Joyce Sides**

ART DEPARTMENT
Assistant Art Director **Robin L. Strelow**
Junior Designer **Meg McArn**
Mechanical Artists **Scotty Billings, Robin Case**

PRODUCTION DEPARTMENT
Production Director **Mark E. Hillyer**
Assistant Production Manager **De Potter**
Production Assistant **Kim Potts**
Typesetting **Terry Cash, Carole Dunton**
Advertising Production Assistant **Anita Armfield**

COMPUTE! PUBLICATIONS
Group Vice President, Publisher/Editorial Director **William Tynan**
Managing Editor **Kathleen Martinek**
Senior Editor **Lance Elko**
Editorial Operations Director **Tony Roberts**
Executive Assistant **Sybil Agee**
Senior Administrative Assistant **Julia Fleming**
Administrative Assistants **Iris Brooks, Cathy McAllister**

ABC CONSUMER MAGAZINES, INC.
Senior Vice President **Richard D. Bay**
Vice President, Advertising **Peter T. Johnsmeyer**
Vice President, Circulation **Robert I. Gursha**
Vice President, Production **Ilene Berson-Weiner**
Director, Financial Analysis **Andrew E. Landis**
Senior Art Director **John Ciofalo**

CIRCULATION DEPARTMENT
Subscriptions **Ora Blackmon-DeBrown, Harold Buckley, Maureen Buckley, Beth Healy, Thomas D. Slater, Raymond Ward**
Newsstand **Mitch Frank, Jana Friedman**
Customer Service **S. Adekemi-Adaralegbe**
Subscriber Service **(800) 727-6937**

One of the ABC PUBLISHING Companies
President Robert G. Burton
1330 Avenue of the Americas
New York, NY 10019

ADVERTISING OFFICES
New York: ABC Consumer Magazines, Inc., 825 Seventh Ave., New York, NY 10019. Tel. (212) 265-8360. Bernard J. Theobald, Jr., Group Advertising Director.
Greensboro: COMPUTE! Publications, Suite 200, 324 West Wendover Ave., Greensboro, NC 27408. Tel. (919) 275-9809. Kathleen Ingram.
New England & Mid-Atlantic: Bernard J. Theobald, Jr., (212) 315-1665; Peter Hardy (508) 681-9000; Kathleen Ingram (919) 275-9809.
Midwest & Southwest: Jerry Thompson, Lucille Dennis, Jennifer Delfs (312) 726-6047 [Chicago]; (713) 731-2605 [Texas]; (303) 595-9299 [Colorado]; (415) 348-8222 [California]; Ed Winchell (213) 376-1676.
West, Northwest, & British Columbia: Jerry Thompson, Lucille Dennis, Jennifer Delfs (415) 348-8222; Ed Winchell (213) 376-1676.
Southeast & International: Peter Hardy (508) 681-9000; Kathleen Ingram (919) 275-9809.

Editorial inquiries should be addressed to The Editor, COMPUTE!, Suite 200, 324 West Wendover Ave., Greensboro, NC 27408

PRINTED IN THE U.S.A.

Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to PC Feedback, COMPUTE!'s PC Magazine, *P.O. Box 5406, Greensboro, NC 27403. We regret that we cannot provide personal replies to technical questions.*

Ed. note: Unsigned letters in this column are compilations of reader inquiries.

Computer Care

I recently purchased an IBM PS/2 Model 30. I have never owned a computer before, and I'd like to know how to take care of my system. My printer manual has several pages devoted to proper maintenance such as what to avoid and how to clean it, but my computer manual has no such information. Also, I've seen ads for disk drive cleaning kits. Do I need to clean my disk drives? If so, how frequently?

Janice M. Talluto
Metairie, LA

Modern personal computers are extremely robust. The internals of the machine—the microprocessor, memory boards, disk drives, and so forth—are safely stored inside a protective metal cover. If the computer is kept in a relatively dust- and smoke-free area and is never opened, you'll probably never need to perform any maintenance on it at all.

If you ever do need to open it up—to install more memory, a disk drive, or a modem, for instance—here are a few simple tips you can follow. Do your work in a clean, well-lit area. Find an area as free of static electricity as possible (static electricity can be fatal to your computer's electronic components). To get rid of static electricity, follow this procedure: First, shut the computer off. While the computer is still plugged in, touch the computer's metal case and then each of your tools and any peripherals you're installing. Now you're ready to unplug the computer and open it. Keep track of where each screw goes—there's no worse feeling than having a screw left over after you've put a computer back together. Follow the peripheral's installation directions; then reassemble the computer and plug it back in.

Monitors are good at attracting dust. The keyboard is also a natural collecting point for dust and grime. These can be cleaned with a soft cloth moistened with a solution containing a mild solvent. (One monitor manufacturer recommends a solution of one part liquid fabric softener to three parts water.) Notice the word moistened. Don't *pour cleaning solvent on your monitor or keyboard. Instead, dip the cloth in the solution and thoroughly ring it out before cleaning the monitor or keyboard. If the computer is kept in a dusty area, you might also consider buying covers for the system unit, monitor, and keyboard when they're not in use.*

A disk drive cleaning kit is usually not necessary. Indeed, some cleaning kits use abrasive solvents that do more harm than good. One thing that might be necessary from time to time, however, is to have your drive aligned. If your drive has problems reading disks formatted on other computers, or disks it has previously formatted, take it to someone qualified to service it. Aligning a disk drive is not a job for an inexperienced user.

In the computer world, the best words of advice are, "If it ain't broke, don't fix it."

Circular Problems

I have a Tandy 1000TX, and I'm having a little trouble with the BASIC circle statement. I know how to make circles that are round, but I can't make ellipses. Specifically, I don't understand the *start, end* and *aspect* parameters. I sometimes get shapes with straight lines, or only part of a circle. Can you help me?

Ross Del Dola
Sumner, WA

The syntax for the circle statement is

CIRCLE [STEP] *(x,y), radius [,color [,start, end [,aspect]]]*

This seems like a mouthful, but it's not difficult if you take it one step at a time. The parameters in brackets are optional; you don't need to use them if you don't want to.

The circle doesn't have to be a complete circle; you can use the circle statement to draw half-circles or quarter-circles. In fact, you can draw an arc of any size. The beginning and ending points of the arc are controlled by the start and end parameters. And here is where the circle statement gets tricky: You'd expect the start and end parameters to be in degrees, but the circle statement is expecting these parameters in radians.

You may have run across radians in your high school algebra or geometry class. We aren't going to give an explanation of radians here, but we will give you a simple formula for converting from degrees to radians:

```
Radians = (Degrees / 180) * PI
```

PI, of course, is the ratio of a circle's circumference to its diameter. Although it's an irrational number, a good approximation is 3.141592654. All put together, an arc-drawing routine might look something like this:

```
10 DEF FNRADS(Z) = (Z / 180) *
   3.141592654
20 X = 100:Y = 100:R = 30:C = 2:START
   = 0:END = 90:ASPECT = 1
30 CLS:SCREEN 1:COLOR 0,0
40 CIRCLE (X,Y),R,C,FNRADS
   (START),FNRADS(END),ASPECT
```

This section of code draws an arc from 0 degrees through 90 degrees. The X and Y parameters control where the center of the arc is located. R is the radius of the arc, and C is the color it will be drawn in. START and END are the beginning and ending points of the arc, in degrees. The RADS function is responsible for converting degrees to radians. The final parameter, ASPECT, controls how distorted the arc is.

To explain ASPECT, let's assume you wish to draw a complete circle. ASPECT is the ratio of the circle's Y radius to its X radius. The aspect ratio of a perfect circle is 1 (the X- and Y-axis are the same length). You can draw an ellipse by specifying a nonzero ASPECT. The aspect ratio of an ellipse that is longer than it is high is less than 1, like 0.25. A tall, narrow ellipse has an aspect greater than 1, like 2.

Disk Drive Dilemma

I am interested in purchasing another disk drive. In the past, double-density 5¼-inch disk drives were the only ones available, but today I have a choice of high- or double-density drives in either 5¼- or 3½-inch formats. Can you tell me the advantages and disadvantages of each format? Do disks of one format work with a drive of a different format?

Michael R. Smithson
West Hills, CA

Back when the home computer was first

becoming a reality, programs and data were stored on cassette tape. Storage space on these cassettes was limited, and programs took several minutes to load. With the introduction of the Disk II from Apple Computer, the disk drive became a practical, though costly, home computer peripheral. Up to 143K of programs and data could be stored on a single floppy disk. The Disk II was not only faster but also more reliable than using cassette storage.

When the PC was first introduced, the floppy disk had not yet become the standard storage medium—an adapter cable for a cassette drive was an option on the original PC. There was only one type of disk drive: a 5¼-inch, eight-sectors-per-track drive. It provided fast, reliable access to 160K of programs and data.

A lot has happened in the seven years since the PC's introduction. The 5¼-inch format is still the default standard, but it's rapidly being overtaken by the 3½-inch format. To add further confusion, both drives come in high and double density.

The standard double-density 5¼-inch drive can store 360K of programs and data. It can read from or write to a double-density disk only. The high-density 5¼-inch drive can store 1.2 megabytes' worth of information on a high-density disk. It can read from, write to, and format double-density disks, too.

We don't recommend formatting double-density disks on a high-density drive, however, because we've had some trouble when the disk was used in both a high- and double-density drive. High-density disks cost a little more than their double-density counterparts, but if you store a lot of data, the high-density format is more economical in the long run.

In all probability, the 3½-inch format will soon be the industry standard. First introduced with the Apple Macintosh, it has become the standard drive for new Commodore and Atari computers as well.

With the introduction of its PS/2 line, IBM has followed Apple's lead, and it's easy to see why. A 3½-inch disk holds more information than a corresponding 5¼-inch disk of the same density. The disks, which are smaller, are enclosed in a rigid plastic shell for better protection. A 3½-inch disk has a sliding tab that can be closed to allow writing to the disk (no need to punch holes in the side of these disks!) and then opened to write-protect the disk. Like the 5¼-inch format, a high-density 3½-inch drive can read from and write to the double-density format, but not vice versa.

Neither 5¼- nor 3½-inch drives can read from or write to disks of the other format. Files can be copied from one type of drive to another, however. Since you already have a 5¼-inch drive, a 3½-inch drive would make a nice addition. You'd have the best of both worlds—the standard drive of both today and tomorrow.

Binary Fractions

I'm writing a program in BASIC on my Xerox 6060 PC AT compatible. I'm having problems with the INPUT statement—I don't always get the number typed in. For example, when I input 9.65, the computer prints out 9.649999. When I input 8.6, it displays 8.600001. Is this a bug in my computer or in my version of BASIC?

J. E. Davidson
Pittsburgh, PA

There's nothing wrong with your computer or your BASIC. The reason you're getting these results is that computers use binary (base 2) rather than decimal numbers. Some decimal numbers can't be stored exactly in binary form, and vice versa.

To understand what is happening, let's consider converting fractions to decimals. Some fractions can be converted exactly; others can't. For example, the fraction ¼ converts exactly to decimal 0.25. However, the fraction ⅓ converts to 0.3333 . . . , with 3's extending indefinitely. An exact conversion is not possible. This is the problem your computer is having—9.65 can be converted exactly in decimal notation, but not in binary.

Although binary fractions aren't always exact, they're generally very close—so close that the error is usually insignificant. If you need exact results, you'll probably need to use integer numbers rather than floating-point numbers.

A floating-point number can be represented in integer form by shifting the decimal point to the right until the decimal portion of the number is eliminated. When the number is to be displayed, the integer can be converted to a string with the decimal inserted in the correct position. Let's say you need two decimal places of precision. You might use a routine like this for entering numbers:

```
10 JF = 0:DP = 0:ND = 2:NUM$ =
   "":CLS:LOCATE 15,1:PRINT "Please
   enter a number ->";
20 T$ = INKEY$:IF T$ = "" THEN 20
30 T = ASC(T$):IF (T > 47 AND T < 58)
   THEN PRINT T$;:NUM$ = NUM$ +
   T$:JF = JF + 1:GOTO 20:REM
   ACCEPT NUMBERS
40 IF (T = 46 AND DP = 0) THEN PRINT
   T$;:NUM$ = NUM$ + T$:JF = JF +
   1:DP = JF:GOTO 20:REM ACCEPT
   DECIMAL POINT
50 IF (T = 45 AND JF = 0) THEN PRINT
   T$;:NUM$ = NUM$ + T$:JF = JF +
   1:GOTO 20:REM ACCEPT NEGATIVE
   SIGN
60 IF T = 13 THEN 110:REM CARRIAGE
   RETURN ENDS STRING
70 IF T <> 8 OR JF = 0 THEN 20:IF
   LENGTH >0, DELETE LAST
   CHARACTER
80 IF RIGHT$(NUM$,1) = "." THEN DP
   = 0:JF = JF - 1:NUM$ = LEFT
   $(NUM$,JF):GOTO 100
90 JF = JF - 1:NUM$ = LEFT$(NUM$,JF)
100 LOCATE 15,25+JF:PRINT " ";:
    LOCATE 15,25+JF:GOTO 20
110 FOR RC = 1 TO ND:NUM$ = NUM$
    + "0":NEXT
120 IF DP <> 0 THEN NUM$ = MID
    $(NUM$,1,DP-1) +
    MID$(NUM$,DP+1,ND)
130 IF JF = 1 AND LEFT$(NUM$,1) =
    "-" THEN NUM$ = "0"
140 PRINT:NUMBER = VAL(NUM$)
```

This routine gets a string from the user, ignoring nonnumeric characters. The string is then converted into a number, shifting the decimal two places to the right. Using this routine, you can get two (or more) numbers from the user and perform mathematical operations on them with no loss of precision to two decimal places. To display the results, convert the number back into a string with the decimal inserted ND digits from the right. This routine can be easily modified for more digits of precision by simply changing the value of ND in line 10.

RECOVER with Caution

There's a file on my DOS master disk called RECOVER.COM. I made the mistake of using it on a floppy disk—I'm glad I didn't use it on my hard drive. It changed every filename on the disk to an anonymous FILE000x.REC. I can't determine, for example, whether FILE0005.REC is a spreadsheet file or a letter to my mother. Fortunately, the disk was backed up. What does RECOVER do?

If used wisely, RECOVER can be a useful tool. Unfortunately, its use often results in mayhem. The program doesn't warn you of the havoc it's about to cause.

The purpose of the RECOVER program is to help repair faulty disks. Disks are ruined three ways: a bad File Allocation Table (FAT), a bad directory, or a damaged data area. RECOVER is useful in the latter two cases. If you enter

RECOVER A:

RECOVER reconstructs a damaged directory on a disk in drive A by tracing chains in the FAT. If you enter

RECOVER filename

it removes bad data areas from the file. Here's a more detailed explanation of how RECOVER works.

Drives read files by first looking up the filename in a directory. Each file's directory entry contains a number that points to a table entry in the FAT. Each table entry corresponds to one cluster on the disk (a cluster is a section of disk storage space). Each FAT entry in turn points to another FAT entry, which contains the next cluster in the file.

For example, the directory entry for a file called ANYFILE might point to entry 23 in the FAT. Table entry 23 points to 24, 24 points to 25, and 26 contains a mark indicating that it is the last entry

LOTTO! $5 DEMO DISK

Only **GAIL HOWARD,** the NATION'S ORIGINAL LOTTERY EXPERT, has documented evidence of LOTTERY JACKPOT WINNERS using her published and computerized systems.

AND ONLY GAIL HOWARD has the confidence to bring you this very special limited time offer.

DEMONSTRATION DISK ONLY $5.00

for your evaluation of GAIL HOWARD'S **SMART LUCK COMPUTER ADVANTAGE™**. You get all Gail's famous LOTTERY ADVANTAGE charts to help you pick the best numbers to play in your favorite state or international game. Please specify. Demo includes the *entire* list of past winning numbers to your game.

★ **FREE** ★
with your Demo Disk order
GAIL HOWARD'S 64 Page Pocket Guide to LOTTERY WINNING WHEELING SYSTEMS

Gail Howard's Demo Disk—check or money order only $5.00 for 5-1/4" — $6.00 for 3-1/2"

"My challenge is to prove to you and my competitors that my systems offer the best scientific strategies on ***how to increase your chances of winning the Lottery****"*
— Gail Howard

To order THE COMPLETE GAIL HOWARD SYSTEMS

Gail Howard's Smart Luck Computer Wheel™ ($29.95+$2 s/h). Over 100 Wheeling Systems with minimum win guarantees.

Gail Howard's Smart Luck Computer Advantage™ ($39.95+$2 s/h) has the most successful number selection systems for beating the odds in Lotto. *Entire* winning numbers list for one Lotto game of your choice. ($7/ea. *additional* Lotto game). **Please specify *which*** Lotto game(s).

Gail Howard's Book, *LOTTO: HOW TO WHEEL A FORTUNE* (228 pages $14.95 + $2 s/h)

VISA MasterCard

SMART LUCK COMPUTER SYSTEMS
Dept. P-3, P.O. Box 1519 — White Plains, New York 10602
(312) 934-3300

for that file. The data for ANYFILE is found on the disk in clusters 23, 24, 25, and 26.

If ANYFILE's directory entry is damaged, it may no longer point to ANYFILE's data. The result is an unreadable file. RECOVER constructs a new directory by following chains of clusters in the FAT. Since filenames are lost in the damaged directory entries, RECOVER must fabricate a new name for each file—hence the FILE000x.REC names that you found on your disk.

RECOVER can also remove damaged data areas from the chain. Suppose, for example, that a stray fingerprint lands on a sector of a disk which contains some of ANYFILE's data, perhaps cluster 24. To reclaim the file, RECOVER removes the pointer in the FAT which points to cluster 24. The directory for ANYFILE points to table entry 23, which now points to 25 instead of 24, and so on. RECOVER effectively removes cluster 24 from the file.

If ANYFILE is a text file, the missing data can be retyped. Unfortunately, executable files (those with .EXE, .COM, or .BAT extensions) won't run unless every bit remains intact. Removing part of an executable file is fatal to the program.

RECOVER should be used only as a last resort. If you experience disk difficulties, commercial programs such as Norton Utilities *or* File Rescue Plus *provide better disk recovery.*

Trapping Errors

I'm writing an adventure game in BASIC, and I'm having a few problems. I'd like to have a save-game feature, but the program sometimes crashes with a Disk Full message. Can you show me a way of trapping this error?

Nathan Anderson
Scranton, PA

BASIC provides an easy way to trap errors: the ON ERROR GOTO and RESUME statements. The syntax of the ON ERROR GOTO statement is as follows:

ON ERROR GOTO ***linenumber***

After this statement is executed, BASIC will jump to the specified line automatically whenever an error occurs. To trap errors, write an error-handling routine and then use this statement to transfer program control to the routine whenever an error occurs. The RESUME statement normally ends such a routine—it tells BASIC to jump back to the line in which the error occurred.

BASIC has two reserved variables associated with this statement: ERR and ERL. Whenever an error occurs, BASIC places an error code in ERR. ERL contains the number of the line in which the error occurred. The error code for Disk Full is 61 (you'll find a complete list of error codes in your BASIC manual). If you're trapping for this error, a section of your error-handling routine might look like this:

```
1000 IF ERR = 61 THEN PRINT "The disk
     is full, operation canceled.":CLOSE
     :GOTO 200
```

Note that this line ends in a GOTO rather than a RESUME. If control was transferred back to the same place in the main program, the program would continue trying to write to disk and would probably cause an error 52 (bad file number). Instead, this statement closes the file and then returns to the main loop in the main program.

Jump-Starting a Disk Drive

I recently installed a 3½-inch disk drive in my computer, and it's been acting very strangely. The first disk I put in the drive has no problems, but if I swap disks, the directory command lists the directory of the first disk! If I try to type the contents of one of the files listed, I get garbage. After doing this, the entire disk is corrupt—even CHKDSK /F can't recover my data. I seem to have fewer problems if I run CHKDSK immediately after swapping disks, but even that isn't foolproof. I'm beginning to think that the money spent on the drive was wasted—I don't dare store valuable information on a 3½-inch disk. Can you help me?

We recently installed a Toshiba 3½-inch drive in an AT compatible and had the same problem you describe. The drive would behave normally at first, but when a new disk was put in the drive, the problems began. After a lot of head scratching, we discovered the drive was configured for an XT-style computer.

Every PC disk drive has an internal switch. When you put a disk in the drive, the disk presses against the switch, and DOS knows there's a disk in the drive. When you take the disk out, the switch is released and DOS knows there's no disk in the drive.

On 3½-inch drives, line 34 is the disk change line. Depending on whether your computer is an XT or an AT compatible, pin 34 must be open or closed, respectively. Our Toshiba drive has a jumper that controls whether pin 34 is closed. It was set open—the XT position. We switched the jumper, put the drive back in the computer, crossed our fingers, and turned the computer on. The drive worked perfectly and continues to do so.

If your 3½-inch drive has the symptoms described above and you're confident of your skills, you can easily make this change yourself. If not, contact the manufacturer of the drive, who may offer to fix it for free.

Compilation and responses by Jim Fuchs, Assistant Technical Editor **PC**

GETTING DOWN TO BUSINESS

Say No *to Hard Disk Disaster*

Robert A. Moskowitz

Your hard disk is an extremely reliable and hardy piece of high technology. But that's no excuse for treating it like yesterday's newspaper. Unless you take steps to protect the contents of your hard disk, you're courting a major twist in your internal organs and a major setback to your productivity when a problem develops.

Like other high-tech gear, hard disks seem to unerringly sense when you absolutely cannot afford a failure—and that's when they break down. There's no convenient time for a hard disk failure, of course, but if you don't adequately prepare for one, you're asking for a gut-wrenching experience that could cost you hundreds, thousands, even tens of thousands of dollars—as well as jeopardize your job or the viability of your business.

Blam! Pow! Crunch!

Everyone has heard stories of inopportune hard disk failures, so I won't offer any here. But these stories are all the more poignant because such disasters are so easy to avoid today.

You can protect yourself and your data simply by making regular backup copies onto floppy disks or magnetic tapes according to rigorous procedures. With suitable backup disks or tapes in storage, even the most severe hard disk failure at the most inopportune moment need cost no more than a morning's work and the price of a suitable replacement hard disk.

If your hard disk explodes, for example, you can simply run to the store and buy a new one. With a backup copy of your data and program files available, in a short time you'll be up and running again.

In fact, though, most hard disk failures won't cost more than a few hours' work to reformat and reload the disk. In most cases, virtually no data need be lost.

If you're reluctant to fiddle with backups, you may be harboring feelings that were generated when PC technology was young and far less convenient to use.

Powerful Products

Even as recently as two or three years ago, making a backup copy of your hard disk's data could be a long and tedious process. But in the past year, many backup programs have reached the market that greatly simplify the process.

Some of the best backup programs include *Fastback Plus* (Fifth Generation Systems, 11200 Industriplex Boulevard, Baton Rouge, Louisiana 70809-4112; $189.00), *Back-It* (Gazelle Systems, 42 North University Avenue #10, Provo, Utah 84601; $129.95), *Intelligent Backup* (Sterling Software, 202 East Airport Drive #280, San Bernardino, California 92408; $149.95), *Corefast* (Core International, 7171 North Federal Highway, Boca Raton, Florida 33421; $149.00), and *PC Fullback* (Westlake Data, P.O. Box 1711, Austin, Texas 78767; $59.95).

Backup Plan

To begin, you establish a simple set of procedures for making backup copies of your hard disk data. Then you—and all other users of the computer—follow them rigorously.

Your backup procedures should specify who is to make backups—just you, certain users, or every user—and how often to make them. The commonsense guideline is to make backup copies frequently enough that in the event of a hard disk problem, you won't mind the cost and effort required to rekey or otherwise restore the data files created or modified since the last backup.

In practical terms, if you're writing a novel or posting hundreds of transactions each day, you may want to do backups a half-dozen times a week. But if you're fine-tuning a poem or analyzing data with a spreadsheet from which you make frequent printouts, you may want to back up only weekly or even biweekly.

Another consideration is the type of backup you generally make. Your first backup copy, of course, will be a full copy of everything on your hard disk. This is a snapshot of your programs and data files that, appropriately, is sometimes called an *image backup*. In the event of hard disk failure, you can go back to the situation captured in your snapshot and continue working from there.

But as you work, you inevitably modify some, but rarely all, of your files. Since making a backup copy does take time, require some effort, and occupy storage media (whether floppy disks, tapes, or something else), it's natural to consider the possibilities for backing up only the changes instead of making repeated copies of the unchanged files.

Between Backups

There are two different ways to make backup copies of your changed files, and the one you choose depends on your work habits and your strategy for keeping backups.

Differential backup copies include only files changed since you made your last full backup. Thus, if you make a full backup and then change file A only once, it will be included in every differential backup copy you make, even if you never change that file again. Once you make a second full backup, file A will not be included in further differential backup copies unless you change it some more.

Incremental backup copies include only files changed since your last incremental backup. Thus, if you make a full backup and then change file A only once, it will be included only in the first incremental backup copy you make, not in subsequent incremental backup copies. If you change file A again, it will be included, as before, only in the very next incremental backup copy you make. Once you make a second full backup, file A will not be included in further incremental backup copies until you change it again.

The main differences between incremental and differential backups are that incremental backups tend to be smaller and thus faster to make. But you must keep all your incremental backup copies to be sure you have the most up-to-date copy of every file on your hard disk.

Restoring the most recent version of a particular file from incremental backup copies can become a tedious chore. Differential backups can grow fairly large as you change more and more files, but you only need to keep the latest differential backup copy.

Safe Backups

Whether full, differential, or incremental, each backup copy should be clearly marked. Most modern backup software automatically labels the backup with the date and time the copy was made, as well as its type. But users can easily become confused or forget the labeling conventions. It's important to clearly label the backup copy as it is being made with the date and time, sequence numbers (if multiple disks or tapes are involved), and other necessary identifying information.

For safety, store the backup copies in a location separate from the computer itself. This minimizes the danger that a single fire or other catastrophe will destroy both the backups and the originals.

If your business depends very heavily on the data, you might want to make one or more duplicates of each backup copy and keep them off site—in your home, for example, or in a safety deposit box at your bank.

Dear Diary

Your backup procedures should include instructions to keep a written log of the time and date each backup is made. Enter the type of backup made (full, differential, or incremental), too, as well as the identification placed on the backup and directions telling exactly where to find the backups.

With your backup procedures established, put a copy of the backup software into a special subdirectory on your hard disk and keep another copy with your backups.

Configure the software to operate the way you want it to. Many programs can be set to provide very simple menu systems so that uninitiated users (or busy users who don't want to puzzle things out every time they make a backup) can operate the software with just a few keystrokes.

It's also useful to put a text file in the subdirectory with instructions about how to make the kind of backup you prefer. You can instruct other users to read this file as part of the backup procedures.

Don't overlook the obvious, either. It often pays to paste a note right on the face of the computer telling people when to make the backup copy and how to start the procedure properly.

Disaster-Prevention Checklist

- ☐ Choose your backup software carefully.
- ☐ Be sure to make copies of your backup program.
- ☐ Make full backups at regular intervals.
- ☐ Decide whether you need to make differential or incremental backups between full backups.
- ☐ Make your differential or incremental backups at regular intervals.
- ☐ Label all disks carefully.
- ☐ Store backup disks in a safe place away from the computer.
- ☐ Keep a written log of your backups.

Alternatives

If you can afford it, you might want to install new technology that provides a smoother way to make data backups for PCs. For years, mainframes and even minicomputers have had the capability of making continuous backups that store every user's keystrokes in case of a system failure.

A hardware/software product called the *NonStop Backup System*—from Digital Storage Systems, in Longmont, Colorado—does this kind of continuous backing up for PCs.

NonStop consists of a high-speed cartridge tape driven by an intelligent controller card and special software that resides in your PC.

The *NonStop* software occupies just 11K of your PC's memory. It monitors the activity between each of your applications and your computer's operating system, and it makes copies of all file changes made by your PC.

The *NonStop* controller card operates continuously with its own processor and memory, so it's very fast. It places its copy of your PC's file information on the tape drive, automatically making a file index as it operates.

With this system, you can simply load a fresh tape and start computing. Every operation is automatically copied, so if your hard disk fouls up, not a minute's worth of work need be lost.

The Restoration

Whether you begin keeping continuous or more traditional snapshot backups, you'll have great flexibility to make use of the copies in any way you prefer.

In the past, you could choose to restore everything or nothing. But this created problems if your disk messed up only one or two important files. You either had to choose which file was going to be lost, or make individual copies of the important files you wanted to retain after the backup restoration was complete.

An important advantage of modern backup software (and hardware) is that you can restore files very selectively.

Most systems automatically index the files you have backed up and permit you to select files to be restored to your hard disk individually, by subdirectories, or in large groups.

Keeping a Secret

Another significant advantage of some backup systems is their encryption and compaction capabilities. If you have sensitive data, you will want your backups to remain just as secure as your originals. Locks and keys are great security devices, of course, but scrambling the backup copies adds another dimension of protection.

Data redundancy and error correction are other important advances found in modern backup software. *Fastback Plus*, for example, has the potential to restore a data file even if more than 10 percent of the backup medium is physically or magnetically damaged. When used with the verification and comparison procedures built into many backup software packages, today's backup systems give you confidence that the data on your hard disk is accurately stored on your backup copy and that it will be available when you want to retrieve it.

No backup technology can prevent hard disk problems, of course. But careful backup procedures that are used consistently go a long way toward reducing the twist you'll feel in your stomach when your hard disk goes down—as it inevitably will.

Robert Moskowitz is a business consultant based in Woodland Hills, California. He is the author of numerous articles published in a variety of national magazines and is the developer of the computerized Personal Productivity Audit. **PC**

PC NEWS & NOTES

Arlan R. Levitan and the Editors

The NEC UltraLite weighs just four pounds.

Last November's COMDEX (Computer Dealers Exposition) lured over 100,000 computer cronies to Las Vegas to catch up on the latest products and industry trends. *COMPUTE!'s PC Magazine* staffers took time out from literally dozens of parties to make an occasional appearance on the show floor. Here's a roundup of what we found most interesting.

NEC UltraLite

NEC Home Electronics has upped the ante in the lightweight-laptop sweepstakes with the introduction of the NEC UltraLite, a 4.4-pound portable with a full 640K of memory and a backlit display.

The UltraLite is the smallest full-function DOS machine we've seen; it's about the same size as a sheet of paper and less than 1½ inches thick. The UltraLite's slim profile is due in part to elimination of the usually *de rigueur* floppy disk drive. Instead, the UltraLite sports either a one- or two-megabyte nonvolatile ramdisk for data and program storage.

MS-DOS, Microsoft's DOS Manager shell, and Traveling Software's Laplink file-transfer utility are housed in ROM, providing easy file transfer between the UltraLite and any PC compatible equipped with a serial port. An external floppy disk drive is available as an option.

Telecomputing buffs will be pleased with the UltraLite's standard 2400-bps Hayes-compatible internal modem. The UltraLite also has a slot that accepts credit card–sized ROM cards. According to NEC, the first wave of titles available on UltraLite ROM will include *Lotus 1-2-3, WordPerfect,* and *Microsoft Works.*

We spent a little under an hour with an UltraLite in a private one-on-one session at COMDEX and were mightily impressed. The short-throw keyboard was surprisingly comfortable, and we judged the dark blue–on–white display very good in terms of both size and overall legibility.

The system's 9.83-MHz V30 microprocessor and internal ramdisk yield performance very close to that of a hard disk–equipped AT compatible. The machine's light weight is made even more alluring by the system's sleek styling and matte-black finish—it seems almost a shame to slip it into the optional leather case ($129).

The machine's only weak point is battery operation. The two-hour battery life is only half the length of the average coast-to-coast plane flight. We'd be happy to live with that shortcoming if the UltraLite used a snap-in battery pack rather than the cumbersome screw-down compartment on the engineering model we tested. According to NEC, this problem will be addressed in the near future.

The high-tech harvest of the NEC UltraLite does come at a price. The one- and two-megabyte ramdisk versions are $2,999 and $3,799. Considering the UltraLite's uncommon standard features, high performance and unparalleled portability, we expect thousands of Toshiba 1000 fans, Tandy Model 100 users, and folks who have been sitting on the laptop fence waiting for a truly lightweight system to keep UltraLites in short supply for the first half of 1989.

CD-ROM Is Hot

Sony Corporation of America demonstrated production models of its SMO-501 series of high-density optical disc drives that can be written to more than once.

Both internal and external versions of the double-sided drives accept removable 5¼-inch optical cartridges that store up to 650 megabytes of data. Unlike CD-ROM (Compact Disc–Read Only Media) and WORM (Write Once/Read Many) optical storage, the new Sony drives rely on a hybrid process called *magneto-optics.*

CD-ROM and WORM data is stored as a series of microscopic pits literally burned into a nonmagnetic aluminum surface by a laser beam. Magneto-optics uses a combination of magnetic media and laser technology. A laser is used to heat tiny portions of the media surface to its *Curie point,* the temperature at which the magnetic particles forget the data and accept a new magnetic imprint.

According to Sony, the new drives boast an average access time of 40 milliseconds and are capable of sustaining data-transfer rates of almost 7.5 megabits per second. Although the samples being shipped to manufacturers are still somewhat pricey ($4,650), the cost of these units is expected to drop to less than $1,000 by the end of 1990.

Floptics

Another hybrid optical technology, often referred to as *Floptics,* is being used by dozens of disk drive manufacturers to develop low-cost storage devices that are less dense than the previously mentioned Sony products but represent a more than tenfold increase over today's 3¼-inch, 1.44-megabyte floppy disk drives.

One example of this new technology is Insite Peripherals' Model 1325 Floptical drive, which stores almost 20 megabytes of data on 3½-inch disks encoded with optical servo tracks for higher track density.

Floptical drives are expected to be available by the fall of 1989, with prices ranging from $500 to $800.

Filling out the COMDEX storage spectrum were prototypes of DAT (Digital Audio Tape) storage systems destined to one day supplant today's cartridge and WORM backup drives. Sony, Hewlett-Packard, and Wangtek displayed units that store 1.3 gigabytes

COMPUTE! Publications Back Issues/ Disk Orders

Individual back copies of *magazines* and *disks* are available by mail only while quantities last.

Please clip or photocopy, and mail completed coupon and check to:

COMPUTE! Publications
Single-Copy Sales
P.O. Box 5188
Greensboro, NC 27403

Name: _____

Street: _____

City: _____

State: _____ Zip: _____

Type of computer: _____

Quantity	Issue (Month/Year)	Magazine or Disk Name	Price*
		SUBTOTAL:	
		NY residents—Add 8¼% Tax:	
		NC residents—Add 5% Tax:	
		TOTAL:	

* Back issues of *COMPUTE!*, *COMPUTE!'s Gazette*, and *Apple Applications* are $6.00 each. The following issues are **NOT** available: ***COMPUTE:*** Fall 1979–3/81, 9/81, 11/81, 2/82–12/82, 2/83, 4/83, 1/85, 11/85–12/85. ***Gazette:*** 7-83–12-83, 1/84–7/84, 9/84, 11/14–12/84, 1/85–7/85, 9/85–11/85, 3/86. ***Apple Applications:*** 6/88.

* Single disks for *COMPUTE!*, *Gazette*, or *Apple Applications* are $15.00. NOTE: No disks dated prior to June 1986 are available.

* Back issues of *COMPUTE!'s PC Magazine* are $16.00 each and back issues of *Atari ST Disk & Magazine* are $8.00 each. (These publications are available only as magazine/disk combinations.) The following issues are **NOT** available: ***PC Magazine:*** 9/87, 11/87. ***Atari ST Disk & Magazine:*** 10/86.

* Disk/magazine combinations are $16.00.

Shipping and handling included.
NO CREDIT-CARD ORDERS ACCEPTED.
Payment must be in U.S. dollars by check drawn on U.S. bank.

315

(1300 megabytes) of data on a Digital Audio Tape cartridge.

Smile, You're on a Floppy Disk

Canon's RC-760 Still Video Camera looks like a large-format single-lens-reflex camera but uses a proprietary two-inch floppy disk instead of film to instantly store as many as 50 still color video images.

The RR-450 Still Video Player is capable of loading the images into any computer that has a video interface board compatible with NTSC or RGB signals. The images can then be directly manipulated by your system's desktop publishing or paint programs.

This is perfect for creating interesting (or incriminating) photographs of your friends, pets, and political rivals.

Double Hard Disk Real Estate

Is your system's hard drive just about filled to the brim? Datatran's DiskDoubler ($189) can double the storage capacity of just about any PC hard drive (including those that use RLL controllers) without loss of performance.

The DiskDoubler is a short expansion card that installs in any PC, XT, or AT slot. After installation is complete, the device automatically compresses data as it is written to disk and decompresses the data when it's read.

Toshiba Prints on the Move

Although a Toshiba response to the NEC UltraLite is not expected until next Spring, Toshiba unveiled its own impressive four-pound package at Winter COMDEX.

The ExpressWriter 301 is a battery-powered portable printer that uses a thermal-transfer printhead to produce print quality closely akin to that of 24-pin printers.

The ExpressWriter 301's friction feed is designed for use with regular-cut sheet paper. No tractor-feed mechanism is included or available at this time. The 301 boasts five resident fonts and emulates the Epson LQ and Qume series of printers. An AC adapter is included in the unit's $489 list price, and the 301's built-in rechargeable nickel-cadmium batteries are good for about one hour of print time per charge.

For those who don't regularly pack their computer for travel, Toshiba has also introduced the ExpressWriter 311, a budget-priced ($589) 24-pin printer with full forms-handling capabilities.

See-Through Mouse

Those with a penchant for see-through products have been able to purchase transparent watches, telephones, and even Polaroid cameras as of late.

While current FCC regulations may make it a long wait for clear plastic cases for microcomputers, those with a penchant for clarity in computing also have cause to celebrate.

Logitech International is commemorating the shipment of its 2 millionth mouse with a limited ClearCase edition of the Logitech Mouse. Prospective collectors who can see their way to coughing up the $149 list price also receive *Paintshow Plus*, a graphics package that can be used to create presentations that are perfectly clear to any audience.

Handy Scanner

DFI, a manufacturer known in the past primarily as a purveyor of high-quality clone components, has introduced the Handy Scanner 3000 ($329), a hand-operated scanning device that incorporates a number of improvements over previously available models.

Scanning resolutions of 100, 200, 300, or 400 dots per inch may be selected, with 32 levels of gray. The HS 3000 uses a four-inch–wide yellow-green scanning light that results in improved rendering of images containing flesh tones.

The scanner comes with software that lets you scan, edit, and save images in multiple graphics formats, including MSP *(Windows Paint)*, IMG *(GEM Paint)*, and PCX (*PC PaintBrush Plus)*.

According to DFI, a future upgrade will add the TIFF format used by most desktop publishing packages to the list. The optional $99 *Carets by Hand* character-recognition software reads six different type fonts, can be trained to read new ones, and automatically merges the left and right sides of scanned text pages.

Scan with Your Printer

Those who prefer the "Look, Ma—no hands" approach can turn their Epson FX-, MX-, RX-, or LQ-series printer into a scanner by purchasing Desktop Technology's SX-1000 scanner ($250).

The SX-1000 simply snaps onto the Epson's printhead carriage and is connected to the supplied interface card. Maximum resolution of the bi-directional scanner is 300 horizontal × 216 vertical dots per inch, with eight

CINEMAWARE
PRESENTS
ROCKET RANGER
Only YOU can stop the Interplanetary Spread of Jet-Propelled NAZI FACISM!
A Master Race from Outer Space threatens the Fate of the Free World!
SEE THE BEAUTIFUL YOUNG DAUGHTER OF A FAMOUS SCIENTIST— HELD CAPTIVE BY A GANG OF GODLESS GOOSESTEPPERS!
Actual Amiga Screens

NOW PLAYING AT A SOFTWARE DEALER NEAR YOU

Available for Amiga, Commodore 64, IBM PC, Apple IIgs, and Atari ST, which are trademarks respectively of Commodore-Amiga, Commodore Electronics, Ltd., International Business Machines, Apple Computer Inc., and Atari Inc.

Cinemaware Corporation, 4165 Thousand Oaks Blvd., Westlake Village, CA 91362

OUTSTANDING SOFTWARE

$2.49 Per Disk ($2.99 per disk when ordering less than 10)

Satisfaction Guaranteed or Money Back!

BUSINESS

☐ 13 **Express Calc** - (2 disks) Powerful financial spreadsheet.
☐ 53 **EZ-Forms** - Create, fill in, print yr business forms. 512K.
☐ 79 **Invoicer** - Generate invoices, ease record keeping.
☐ 117 **Finance Mgr II** - (2 disks) Handle personal/bus finances.
☐ 135 **PC-Acct** - (2 disks) Manage books, track inventory, sales.
☐ 159 **Mass Appeal** - Mail mgr for envelopes, labels and more.
☐ 190 **PDS*Quote** - Compute job/cost estimates. 640K.
☐ 201 **Checks** - Log bank transactions, produce financial rpts.
☐ 226 **File Express** - (2 disks) Menu driven all purp database.
☐ 232 **Dr Data** - (2 disks) Friendly, easy-to-use mail mgr. 640K.
☐ 234 **T-Master** - Control & update inventory. Know daily levels.
☐ 316 **Tracker** - Manage clients, sales prospects! 512K, hrd dsk.
☐ 319 **EZ-Desk** - (2 disks) Keep appointments, update agendas.
☐ 337 **Charge** - Analyze your credit charges, payments, interest.
☐ 383 **Mutual Fund Mgr** - Track yr portfolio, get weekly reports.

EDUCATION

☐ 186 **DOS Tutor** - Learn DOS painlessly w/this interactive tutor!
☐ 191 **PC-Quizzer** - Learn music, States, etc. Sign lang demo.
☐ 228 **PC-Fastype** - Teaches typing. Builds dazzling speed! ★
☐ 297 **XY-Solve** - Graphic math game makes learning fun!
☐ 366 **Gradescan** - Makes it simple to keep and avg grades.
☐ 376 **GradeM** - Teachers/students can track/summarize grades.
☐ 384 **XY-See** - (2 disks) Graphic math for HS/college students.

GRAPHICS

☐ 58 **Chemview** - Rotating 3-D molecular structures. EGA.
☐ 145 **Fingerpaint** - (2 disks) Paint! Also obj oriented dsgn. ★
☐ 210 **Dancad3D** - (2 disks) Advanced design. 640K/hrd dsk. ★
☐ 285 **Surfmodl** - (3 disks) Produce & shade 3-D images. ★
☐ 356 **Geoclock** - (2 disks) Time map w/sun, dark areas! EGA.
☐ 362 **VGACad** - (2 disks) Super res 256 color painting! VGA.

GAMES

☐ 15 **Biblemen** - Excercise knowledge of Bible figures/events.
☐ 23 **Star Trek** - Amazing high res! Also Othello, Artillery. EGA.
☐ 28 **Wordplay** - (Ik Wheel of Fortune). Also Backgammon. ★
☐ 84 **Solitaire** - Grt card games, Spider, Klondike, Canfield! ★
☐ 121 **Arcade** - Qubert, Pango, Centipede, Hopper & more. ★
☐ 151 **Hack** - You & yr trusty dog in a wild adventure (Ik Rogue).
☐ 176 **Striker** - Helicopter attck. Also Risk, world domination. ★
☐ 215 **Phrase Craze** - Solve word puzzles or create your own!
☐ 289 **3-D Packman** - Also Kong, Spacewar, ABM (missiles). ★
☐ 309 **Blackjack** - (you set rules). Also ArmchairQB & Empire!
☐ 321 **Adventure** - Explore the caves! Also Castle, Star Trek.
☐ 365 **Adventure Game Toolkit** - (5 disks) Play, create yr own!
☐ 372 **Pinball** - Also Othello, Dragons, Sopwith, Battleship. ★

UTILITIES

☐ 138 **Printer Utilities** - Spooling, banners, fonts & more!
☐ 214 **Zip-Phone** - (2 disks) Xrefs phon# to zipcode & vice-vers.
☐ 258 **Easy Access** - Setup a menu sys for your PC. Hard disk.
☐ 275 **DOS Utilities** - Large collection of invaluable general utils.

MISCELLANEOUS

☐ 31 **Movie Database** - (2 disks) Lists 4,000+ films. Grt trivia!
☐ 48 **Wisdom of the Ages** - (4 disks) 6000+ famous quotes.
☐ 72 **Bible** - (12 disks) Cmplt indxd King James bible! Hrd dsk.
☐ 74 **Landlord** - Trouble w/yr landlord? Learn your legal rights!
☐ 146 **PC-Lotto** - Helps you beat your state's lotto odds!
☐ 153 **PC-Write** - (2 disks) Popular, powerful word processor.
☐ 291 **PianoMan** - (2 disks) Record your tunes or play music.
☐ 367 **Music Library System** - Track your tapes, LPs & CDs.
☐ 386 **Computer Chef** - (2 disks) 150+ grt recipes. Add yr own!

★ Disks so marked above require a color graphics adapter.

■ **Membership Special! $19.95 (reg. $34.95)**

For **$19.95** ($25.95/year for 3.5") become a MicroCom Systems member and get: ***"The Shareware Book"*** ($12.95 separately), a subscription to ***"Shareware Review"*** magazine, **6 free new-release shareware disks** (one featured each issue), low member prices, and any disks in this ad for only **$1.99 each!** ($2.99 for 3.5")

■ **3.5" disks desired (add $1.00/disk to applicable price)**

MicroCom Systems
3673 Enochs Street
Santa Clara, CA
95051

*Cost of disks*_____
*Membership*_____
Shipping $3.00
*CA res tax*_____
*Total encl.*_____

Phone Toll Free for Same-Day Shipment!

VISA **(800) 727-5995** MasterCard
Mon-Fri 7am-9pm, Sat-Sun 8am-5pm

©1988, MCS C0-02/89

levels of gray. Software supplied lets you edit, control image contrast, and save scanned images in PCX and TIFF formats.

Private Screening

Ever been bugged by co-workers looking over your shoulder while you use your PC? The Most Interesting Product of Winter COMDEX award goes to a piece of hardware that may put an end to PC buttinskies for good.

Reflection Technology's Private Eye is a two-ounce miniature monitor that promises to radically alter the way many of us use computers. When mounted on a headset that holds the tiny screen near the eye, Private Eye displays a high-quality 720 × 280 pixel image that appears to float in space approximately two feet away from the viewer's face, with quality and resolution matching those of a good 12-inch PC display screen.

Since the image doesn't occupy the viewer's full field of vision, whatever exists around it in the real world can be viewed independently or integrated with the viewed image. According to Reflection Technology president, Allen Becker, who demonstrated an engineering sample of the device to a curious press, Private Eye will be supplied to manufacturers at a cost between $100 and $500, depending on quantity.

Couch Potatoes

Erstwhile spuds will want to keep their eyes out for *Couch Coach Computerized Fantasy Sports*. Potato League Sports is making book on the product being a favorite of statistics hounds who like to pit one team's past performance against another's in detail before they actually meet on the gridiron.

Couch Coach lets sports mavens track the statistics of 2–16 teams, using input data from newspaper box scores. *Couch Coach* even allows for the buying, selling, and trading of players. *Couch Coach* comes in a football-only version ($50) and a multisport version that handles baseball, basketball, hockey, and soccer as well.

Wrestling with a Computer

Have you ever wondered whether celebrities who endorse products actually use the items they hawk? If you've seen professional wrestler "King Kong" Bundy's advertisements for Vendex's HeadStart computers, you may have wondered if he really uses one and, if he does, for what purpose.

The seven-year veteran of the World Wrestling Federation does use a computer in his home—it's the same HeadStart computer that he appears with in print and on television. He also backs up the ad's claim that it took him only a short time to learn to use the machine.

"They wanted to show that the average man in the street could use it, but can you imagine me being the average man in the street?" said the heavyweight grappler with the clean-shaven head. "They had me sit down and follow it step by step, and I was actually working with the computer in 23 minutes."

"Before I learned to use the HeadStart, I had never used a computer before," Bundy said. "I was like so many other people. The computerese scares you off."

When asked whether Vendex was trying to convey that anyone could use its computer, *even* a professional wrestler, Bundy laughed and said, "Well, I wouldn't say that, but yeah, that's basically it."

Once he overcame his fears and his "handicap" of being a wrestler, Bundy began applying the HeadStart to his everyday life.

"I use it mostly to keep track of my investments and my asset allocation," he said. "I just bought a program for it, *Managing Your Money*, by Andrew Tobias. It's one of the top software programs around for personal money management and investing."

Bundy's life in front of the computer is not all work and no play. He owns several games that he uses to entertain himself and his son.

"I play *Wheel of Fortune*, and I just got my son *Top Gun*," he said. Bundy added that he does own a wrestling game, but he declined to mention which one.

Now that he's caught the computer bug, Bundy wants to learn more about computers and improve his proficiency. "I'd like to move up to the next sophisticated model once I get this one down pat," he said.

Bundy added that he wasn't sure what part computers will play in his life ten years from now. "I don't know; maybe I'll become 'King Kong' Wozniak or something like that."

— *Mickey McLean*

INSTANT BIBLE ACCESS - ONLY $49

QUICKVERSE BIBLE CONCORDANCE

QUICKVERSE BIBLE CONCORDANCE is a fast, easy-to-use tool for general Bible study and in-depth Bible research. QUICKVERSE puts the complete text of the King James, New International, or Revised Standard Version of the Bible at your fingertips, allowing you to:

- Instantly locate any word or verse in the entire Old and New Testament in only tenths of a second - as fast as any Bible research program available today - or faster.
- Perform partial phrase or word searches. For example: searching for ***Bapt* With*** would locate any verse containing ***Baptize With, Baptized With*** and ***Baptizing With.***
- View verses in context. You can easily browse back and forth through surrounding verses and chapters.
- Limit your searches to a particular range of books, chapters or verses.
- Print passages with the search phrase in bold type, and with words added by the KJV translators in italics.
- Supports all popular printers.
- Export passage selections to a file for use with your favorite word processor.
- Display or print scripture in several popular formats (e.g. verse reference following or in front of passage, etc.).

Hard to believe the $49 price? Don't worry, Parsons Technology is known for software that outperforms products costing much more. And the QUICKVERSE BIBLE CONCORDANCE is completely guaranteed. ***If you're not 100% satisfied, return the QUICKVERSE BIBLE CONCORDANCE within 30 days for a full refund*** (excluding shipping).

Parsons Technology

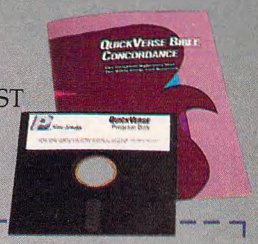
375 Collins Road N.E.
Cedar Rapids, Iowa 52402

Available in IBM or Macintosh versions, with printed manual. Not copy protected.

For Same Day Shipping
VISA, MASTERCARD & C.O.D. ORDERS CALL

1-800-223-6925

(In Canada, call 319/395-7300)
Weekdays 8:30 a.m. to 9:00 p.m. CST
Saturdays 9:00 a.m. to 5:00 p.m.
Or send check or money order payable to Parsons Technology.



Parsons Technology

QUICKVERSE BIBLE CONCORDANCE
$49 + $5 Shipping/Handling

Dept. CPC
375 Collins Road NE
Cedar Rapids, Iowa 52402

NOT COPY PROTECTED
INCLUDES PRINTED MANUAL

Customer may select:
☐ King James Version
☐ New International Version (Add $10 publisher's royalty)
☐ Revised Standard Version (Add $4 publisher's royalty)

Then select IBM or Macintosh version:
☐ IBM or Tandy version ☐ Macintosh version

NAME _____

ADDRESS _____

CITY _____

STATE/ZIP _____

CHECK ☐ MONEY ORDER ☐ VISA ☐ MASTERCARD ☐

CARD # _____ EXP. DATE _____

Iowa residents please add 4% sales tax. Orders outside North America please add $10 shipping and handling.

IBM version requires IBM, Tandy or compatible computer with 256k or more memory, two floppy disk drives or floppy disk drive and hard disk drive, and DOS Release 2.0 or later. (A hard disk drive is recommended but is not required.)

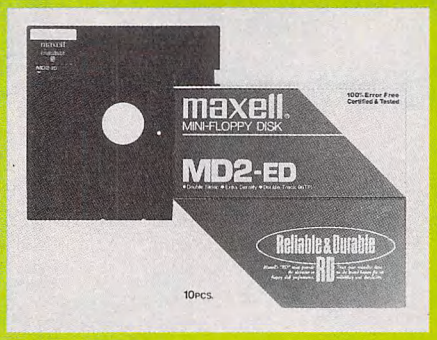
Macintosh version requires 512k or more memory and works with any disk drive configuration.

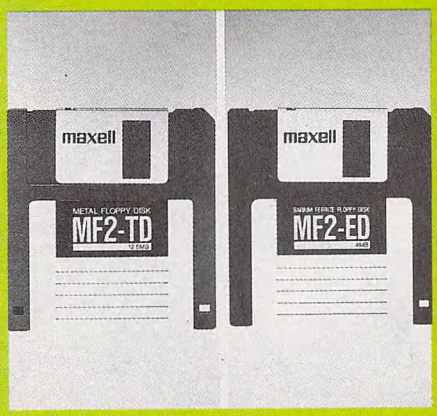
Breakthrough in Mass Storage

How much information can you put on one disk? 360K? 720K? One megabyte? In the months ahead, 5¼- and 3½-inch disks as we now know them will be technologically obsolete. A new generation of high-capacity disks that hold *several megabytes* of data is here.

At Fall COMDEX in Las Vegas, Maxell debuted a 5¼-inch floppy disk with a storage capacity of 3.2 megabytes and 3½-inch disks with storage capacities of 4 and 12.5 megabytes. Your current disk drive won't read these disks, but there are new drives that will. Some may be on the market by the time you read this.

The newly developed YD-801 disk drive, manufactured by Tokyo-based Y-E Data, operates Maxell's new 5¼-inch disk, the MD2-ED. The 4MB, 3½-inch disk (MF2-ED) operates on new drives from TEAC, Toshiba, and Mitsubishi, and on future drives from Sony, Matsushita-Tsushin, Fuji, 3M, and Hitachi-Maxell. The 12.5MB disk (MF2-TD) works with recently introduced drives from NEC and Y-E Data. Each of the new drives can read older (360K or 720K) disks, so there's no need to trash your software library if you upgrade.





High-capacity disks resemble traditional media.

Data-transfer rates for the new drive/disk formats range from 500K per second for the 5¼-inch to 1000K per second for the 4MB 3½-inch and 1250K per second for the 12.5MB 3½-inch. Retail prices for the disks are expected to be $6 (MD2-ED), $16 (MF2-ED), and $20 (MF2-TD).

If Maxell's new storage technology doesn't dazzle you, Brier Technology's will. Brier, a small company out of San Jose, was at COMDEX with 3½-inch disks and drives that, respectively, store and read up to *43MB* of data. The drives (in either internal or stand-alone external styles) come with a built-in SCSI interface, which means that you can use them with your PC if you have a host adapter card.

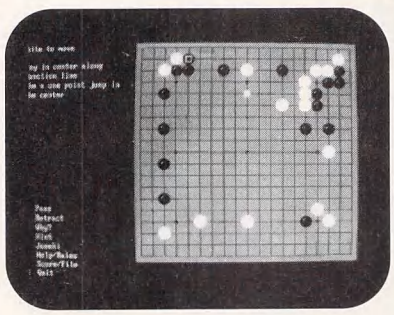
Brier's model BR 3020 is a 21.4MB drive with an impressive 35 ms (millisecond) access time. The BR 3225 has the same features as the 3020, but can read 1MB and 2MB IBM-formatted disks. The BR 3050 stores up to 43.2MB of data per disk with an even more impressive access time of 29 ms. The high-capacity 3½-inch disks use a barium ferrite magnetic composition. Shortly, Brier will be making initial shipments of both disks and drives to companies and computer manufacturers.

Brier expects manufacturers to retail the drives at around $950 (3020), $1,050 (3225), and $1,500 (3050). The 21.4MB disk should come in at around $20 and the 43.2MB disk at around $30.

Regardless of when any of these new-generation products are actually delivered to the consumer market, the important point is that these technologies exist now, and the resulting products will bring unprecedented computing power to the user.

— Lance Elko **PC**

Challenge the North American GO Champion!



We're proud to announce publication of **COSMOS** the strongest computer GO-playing program in North America.*

Here's a GO partner who is ready for a game at any time of day or night. If you've had trouble finding someone to teach you GO or just someone to play against, this is what you've been looking for! Play white or black, with or without handicaps, on boards of 7 x 7 up to 19 x 19. 100 selectable levels of play. Your choice of EGA, CGA, or text-mode graphics. Japanese or Chinese rules.

Cosmos will give any kyu-level player a decent game at normal handicaps, but he is a perfect tutor for beginners. Whenever you ask him, Cosmos will give you hints or explain the reasons behind the move he made. You can record your game and play it back, change your moves and explore other variations. Cosmos is both entertaining and instructive.

GO has fascinated scholars, soldiers, and shoguns for thousands of years. If not having a GO master on call has kept you from learning the game, let Cosmos introduce you to it.

(Requires IBM PC or compatible with a minimum of 512K RAM. Includes 48-page strategy booklet.)

To order, send check or money order to:

ISHI PRESS INTERNATIONAL
1400 N. Shoreline Blvd.
Building A-7C
Mountain View, CA 94043

$39.95 plus $3.00 ship/handl.

(California residents please add local sales tax.)

*Winner of both the 1988 USENIX and International Computer GO (Wei-Chi) Congress, championships.

Wanted: Outstanding Software

COMPUTE!'s PC Magazine is looking for the very best original software to publish on our disk. We pay competitive rates for accepted material. Submit programs on disk with documentation to:

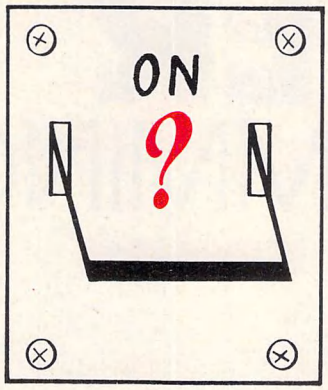
Submissions Reviewer
COMPUTE!'s PC Magazine
P.O. Box 5406
Greensboro, NC 27403.

Or write for a free copy of our Author's Guide.

INTRO DOS

What Happens When You Flip the Switch?

Tony Roberts



System startup files are a source of confusion and fear for many computer users. Because they're unsure what to do with these files, many people choose to ignore them, which is exactly the wrong approach.

These files, specifically CONFIG.SYS and AUTOEXEC.BAT, are designed to be tweaked and should ultimately reflect the personality of the computer's users. Each time you switch on the computer, these files tell the machine how *you* want it to behave.

The Startup Sequence

When first switched on, most PC compatibles test the memory, load the hidden DOS files, load CONFIG.SYS and follow its instructions, load COMMAND.COM, and, finally, load AUTOEXEC.BAT and follow its instructions.

The hidden DOS files (IBMBIO .COM and IMBDOS.COM on PC-DOS systems) are the central nervous system of your computer. Without them you'd get nowhere. These files handle such basic chores as checking the keyboard for a keypress and writing characters to the screen or printer.

COMMAND.COM, the command interpreter, is another crucial element in the DOS package. When you type something at the DOS prompt, COMMAND.COM attempts a translation. If COMMAND.COM understands what you've typed, it carries out your order; otherwise it responds with the familiar message *Bad command or filename.*

COMMAND.COM also performs chores such as displaying directories; setting the time and date; copying, erasing, or renaming files; and creating, changing, or removing subdirectories. These are *internal commands* because nothing other than COMMAND.COM is required. Commands that require a separate file to run—such as FORMAT (FORMAT.COM) or FIND (FIND .EXE)—are *external commands.*

Configuring the System

After the hidden DOS files are loaded, the system checks the root directory to see whether CONFIG.SYS exists, and if it does, loads it and follows its instructions. If no CONFIG.SYS is found, the system operates under its default configuration.

CONFIG.SYS is most often used to install device drivers, allocate buffers, or specify how many files can be open at a time. To see if CONFIG.SYS exists on your system, enter the command TYPE \CONFIG.SYS.

If the file exists, it will be displayed and may look something like this:

```
DEVICE = ANSI.SYS
BUFFERS = 20
FILES = 15
```

These lines instruct the system to install the ANSI.SYS device driver, to allocate 20 buffers for disk drive access, and to allow as many as 15 files to be open at once. The file ANSI.SYS, which is supplied on your DOS disks, allows you to exercise more control over DOS screen colors than normal. Buffers are small areas of memory set aside to facilitate the transfer of information to and from a disk drive.

How do you know what goes in your CONFIG.SYS file? Most applications include such information in their installation material. And, in fact, some software creates or modifies your CONFIG.SYS file to suit its needs.

Word processor users probably need a FILES statement because word processors typically open a lot of files. For example, there's the file or files you're working on, the main dictionary and supplemental dictionaries for the spelling checker, help files, printer drivers, macro files, and maybe more.

Software that constantly accesses the disk may need more buffers allocated to speed up access time. If you have a hard disk, you can improve your system's responsiveness by allocating at least eight buffers.

Modifying the File

To modify or create a CONFIG.SYS file, load it into your word processor or text editor, make the changes, and save it as an ASCII file. ASCII means that the file is stored as simple text with no formatting or printing information. The acronym stands for American Standard Code for Information Interchange.

Most word processors can save files in ASCII. Consult the documentation for instructions. If loading a full-blown word processor to edit a three-line file seems cumbersome, try using a smaller text editor for the task. In January, we included the program *SLED* on the magazine disk. *SLED* is an easy-to-use text editor that loads in a snap and saves all its files in ASCII form.

Running on Autopilot

While CONFIG.SYS sets up the computer for you, the real workhorse of system startup is AUTOEXEC.BAT. This file is simply a list of commands that execute each time you boot up.

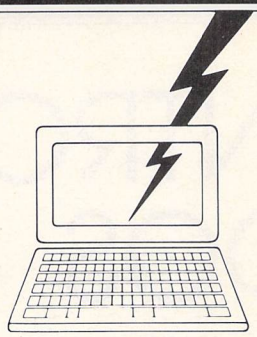
If you have a hard disk, include the PATH command to tell the system where your program files can be found—and perhaps PROMPT PG to modify the system prompt so it tells you which subdirectory is current.

If you regularly load resident programs such as macro utilities, calendars, or keyboard-speedup programs, you can save keystrokes by loading these from AUTOEXEC.BAT. If you normally run a specific application, you can run it directly from AUTOEXEC .BAT, or you can have AUTOEXEC .BAT run other batch files.

I've been building one AUTOEXEC .BAT for months, and it keeps getting bigger and better. My system checks to see who's just turned it on. If it's one of the kids, it presents a menu of their game programs; if it's my wife, it loads her appointment calendar followed by the word processor. If I log on, it dumps me out at the C> prompt, where I can tinker.

Hardly a week goes by when I don't make at least one minor change in my system startup files, and that's a key to successful computer usage. Your CONFIG.SYS and AUTOEXEC.BAT need to grow and change as you and your software collection grow and change. Someone may have set up the system for you, but it's up to you to take it from there. **PC**

POWER PROGRAMMING



Goodbye printf( ) and Writeln. Hello, Debuggers.

Tom Campbell

As ostensibly forward-thinking people, we programmers can become shockingly hidebound in some of our work habits.

We refuse to learn how to use pointers, no matter how much efficiency they give us. We avoid dynamic memory allocation, even if it frees us from the tyranny of arbitrarily defined arrays. We dive into coding at the drop of a hat, no matter how much anguish good design would save us.

And we don't bother to learn our debuggers, even when it could double our programming efficiency. Just getting a new tool doesn't mean we'll understand what it can mean to our work habits.

There were good reasons for that hesitation, once. When interpretive BASIC was our main implementation language, programs tended to be smaller and debugging was a simple matter of scattering STOP and PRINT statements strategically throughout the program. You'd have the program stop and print the values of your variables and you'd continue.

When we moved to compiled languages, those habits came with us. Besides, DEBUG was the only alternative, and unless you were an assembly hacker, DEBUG was only good for hexadecimal dumps and patching .COM files.

But the times, as Bob Dylan said so long ago, they are a changin'.

You'd be surprised at how easy it is to master your compiler's source-level debugger: the one you brag about to your friends who have to use time-sharing systems—the same one you haven't gotten around to learning yet.

Change the Ground Rules

Source-level debuggers let you freeze your program and examine its state. That's what you do when you insert lines like this into your Pascal program:

```
Writeln('ProgStatus is now: ', ProgStatus);
Readln;
```

The problems with this method are legion. It bloats the executable code and clutters the source. You have to comment out the lines (taking care not to nest comments) and recompile when you fix the problem. You need to display the value of each object in question explicitly—and recompile when you change the list. Complex objects (records in Pascal and structures in C) are a pain to deal with in this manner. And you have no way of instructing the compiler to stop only when an object changes value.

Savvy C and *Turbo Pascal* programmers use compiler directives to lessen these problems using conditional compilation, as in this C code fragment:

```
#ifdef DEBUG
printf("Index is now: %d \n", index);
#endif
```

This approach is still far from perfect. In fact, its only redeeming value is that it makes maintaining such code slightly easier than does the first method. But you're still buying easier maintenance for a cruddy situation.

While conditional compilation is a godsend (chiefly for portability and version control), it's no longer the method of choice for debugging. It's time to change the ground rules: Learn your source-level debugger. You might even want to start off the new year by abolishing those embedded print statements altogether.

CPU Spy

A source-level debugger normally lets you do at least these things:

- Create a watch window showing the values of any variables while the program runs.
- Execute the program one line at a time (called *single-stepping*).
- Run the program normally, pausing it at a user-defined breakpoint and resuming it at will.

While you do have to recompile for a debugger, the debug code automatically works on every line and every variable in the program. The debugging information is totally transparent, and its only cost is a very slight decrease in compilation time and a 20-percent or so increase in the size of the executable program.

Advanced debuggers actually let you examine the CPU registers and machine language version of the program, too, along with many other features. We'll stick to the simpler, source-level debuggers that come with many low-priced compilers.

These debuggers are great for those nasty little one-off problems that crop up in places like the boundaries of arrays or end of a file. Here's an example in C:

```
while (--counter)
```

In the above example, the intent is for the body of the loop to execute until the integer variable *counter* becomes 0. That means it should execute once if *counter* is 1. Without a debugger, you'd wrap it with test code:

```
/*
This won't work if counter is equal to 1,
although a post dec. will. Take out the
printf, of course!
*/
main( )
{
  int counter;
  printf(" \nEnter a number for the loop:
```

You can run a business with it.

We do!

We answer the mail and write our manuals with T/Master. *T/Mug*, our newsletter, is produced with it. Even this advertisement was done with T/Master on a *LaserJet* printer.

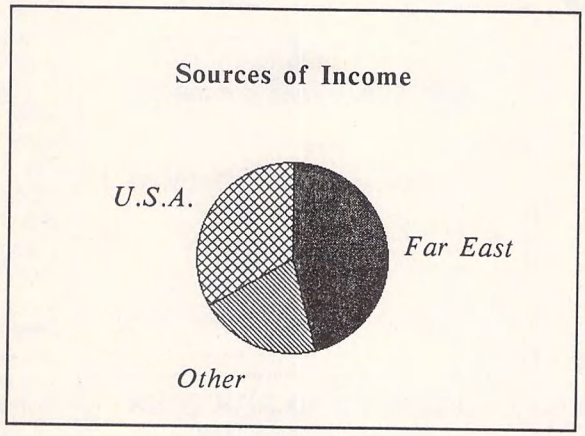
We check our spelling with T/Master and let it find our typos.

When you order, we enter the details with T/Master. After completing a customized screen, T/Master calculates the tax and totals and prints the invoice.

We keep all our books with T/Master. Deposits and expenses are entered using another customized screen.

We generate all our reports with T/Master. It tells us how much we sold in any period, who we sold it too, and what we spent on various items. And it can turn the results into charts automatically.

We plan for the next year with T/Master. Its spreadsheet is uniquely succinct and fun to use. It handles complicated problems too like the mathematical model we use to evaluate advertising alternatives.



columns--------		xxx,xxx DIRECT	xxx,xxx DEALER
+	Price	139	105
* +	Units	3,200	1,200
= +	Gross	444,800	126,000
- ? *40=	Dir. Cost	128,000	48,000
=	Net	316,800	78,000

We send and receive telexes, and use information services with T/Master.

We produce the mailing labels for *T/Mug* with T/Master. And when we surveyed users, we analyzed the results with it. That's how we know 30 percent of users are "fanatics" and another 50 percent are "very satisfied." We also know *fanaticism* correlates highly with *computer usage per day*. The more you use a computer, the more likely your are to be crazy about T/Master.

Because we're using T/Master every day to run our business efficiently, we make sure it can do that job. We put the emphasis on utility and productivity.

If you call us, we can send you an EGA demonstration disk, independent reviews, our own literature, and a copy of our newsletter. If you order, your satisfaction is guaranteed. If you are not happy with T/Master, just return the package in a reasonable time period and we'll issue a refund (less the shipping charges we pay UPS).

$139

T/Master Integrated Software

For IBM Compatibles

T/Maker Research Company

812 Pollard Road (Suite 8), Los Gatos, CA 95030 Voice: (408) 866-0127 FAX: 866-0129

FREE SOFTWARE

A disk **FULL** of the best PD programs we could find. Utilities, games, business and much more all **FREE** and included with our big **DISCOUNT SOFTWARE CATALOG ON DISK.** It's very easy to use and it's chocked full of great software and hardware values! Send $3.95 for S&H and disk or call us for ***FAST*** Service!

Specify MS/DOS, Apple, CM64,MAC

SOFT BYTE

P.O. Box 556, Forest Park Br.
Dayton, OH 45405
(513) 278-1110

Soft-Byte

VISA MasterCard

Spanish, French, Italian

MICROTAC's Language Assistant Series™ software makes writing, studying, and learning a foreign language faster and easier!

Each Assistant provides you with:

- 3,000 + fully conjugated verbs
- Grammar help in over 40 topics
- Examples of proper usage
- Instant access from your word processor!

$39.95 MasterCard VISA $3 shipping. CA 7% tax.

MICROTAC
525 Hawthorn, Suite 11
San Diego, CA 92101
(619) 231-0612

30-Day Money Back Guarantee

☆☆☆☆☆☆☆☆☆☆☆☆

HISTORICAL NAVAL BATTLE SIMULATIONS

APPLE, IBM

SEND S.A.S.E. OR CALL FOR DETAILS

GENERAL QUARTERS SOFTWARE

P.O. BOX 1429
TORRANCE, CA 90505
(213) 547-0597

☆☆☆☆☆☆☆☆☆☆☆☆

ONLY $ 2.00 PER DISK

FOR QUALITY **IBM**
PUBLIC DOMAIN/SHAREWARE

- **FREE** CATALOG
- **HUGE** SELECTION
- **DETAILED DESCRIPTION** OF EACH DISK
- **MANY** PROGRAMMER AIDS
- **FREE IMMEDIATE** DELIVERY (INSIDE USA)
- **NO** MINIMUM ORDER
- **NO** HIDDEN CHARGES
- PAY BY: CASH, CHECK, MONEY ORDER, **VISA, M/C**
- **PHONE ORDERS** ACCEPTED (FOR VISA, M/C)

CSS, P.O. BOX 1323
PASADENA, TX 77501
(713) 472-2458

Statement of Ownership, Management, and Circulation as Required by 39 U.S.C. 3685

1A. COMPUTE!'s PC Magazine
1B. 002697
2. 9-30-88
3. Bimonthly
3A. Six
3B. $59.95
4. 825 7th Ave., New York, NY 10019
5. Same
6. Publisher, William Tynan, 825 7th Ave., New York, NY 10019; Editor, Lance Elko, 324 W. Wendover Ave., Suite 200, Greensboro, NC 27408; Managing Editor, Kathleen Martinek, 324 W. Wendover Ave., Suite 200, Greensboro, NC 27408
7. ABC Consumer Magazines, Inc., a division of ABC Publishing, Inc., a Capital Cities/ABC Inc. Company, 1330 Avenue of the Americas, New York, NY 10019
8. N/A
9. N/A
10. Extent and Nature of Circulation

	Avg. no. copies each issue during preceding 12 months	Actual no. copies of single issue published nearest to filing date
A. Total no. Copies (Net Press Run)	99,710	85,353
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors, and counter sales	15,907	17,766
2. Mail subscriptions	51,482	37,500
C. Total Paid Circulation	67,389	55,266
D. Free Distribution by mail, carrier, or other means, samples, complimentary and other free copies	1,730	2,099
E. Total Distribution	69,119	58,365
F. Copies not Distributed		
1. Office use, left over, unaccounted for, spoiled after printing	5,255	1,704
2. Returns from news agents	25,337	26,284
G. Total	99,711	85,353

I certify that the statements made by me above are correct and complete, William Tynan, Publisher.


```
    ");
    scanf("%d", &counter);
    while (--counter)
    {
        printf("\nCounter is now equal to:
        %d", counter);
    }
}
```

Doing this would lead you to the problem if you were methodical enough to try it with 0 and 1 as test cases. The problem is with the while loop. Note that it uses a predecrement operator, which decrements the counter *before* the exit condition is checked. Thus, if *counter* was 1, it would immediately become 0, so the loop would never execute. One way to solve this problem would be to use a postdecrement, rather than predecrement, operator. Another solution would be to use a do-while loop rather than a while loop.

Using print statements to find bugs can be a time-consuming process. A better way is this: Using *QuickC,* you set Debug *on* at the Compile dialog and recompile. Then instead of issuing the customary Start command to run the program, you select Trace to step through the program one line at a time. At this point it's a good idea to issue the Add Watch command and type *counter* in the dialog. This creates a window that shows the status of the counter variable at all times while the program is running.

When you step through the program by pressing F8, a highlight shows each line as it executes, and you'll notice that the while loop is skipped when the counter hits 1—not when it hits 0, as intended. Once the bug is found, you need merely turn the Debug switch off and compile again.

Beyond Source-Level Debugging

Assembly language programmers should note that Codeview and Turbo Debugger let you cruise through parallel assembly listings. Codeview was a giant leap forward from DEBUG (and Codeview's immediate predecessor, SYMDEB); Turbo Debugger's object-oriented approach is such a staggering leap forward that it will be the sole subject of a future column.

Breaking the Barrier

When I first made serious use of a source-level debugger (Codeview with Microsoft's *MASM* 4.0), what hit me hardest was how simple it all was. It was just like learning batch files: It took me only a day or so to learn the fundamentals. The real investment was in unlearning my old habits and changing my way of thinking about the tools at hand. The time it took to change my old programming habits is more than offset by faster program-development time. **PC**

PC Software for $3.49!

Thousands of IBM/Compatible Public Domain and Shareware Programs Are Available from the Micro Star Library, and Priced at **Only $3.49/Disk**
We feature the best and most up-to-date shareware available.
Our software is guaranteed against bugs, defects and viruses.
And We Offer FREE Technical Support For Our Customers

VISA

ORDER TODAY on our TOLL FREE PHONE LINES

MasterCard

ORDERS SHIPPED OUT SAME OR NEXT DAY

GAMES

- ☐ **JET SET FLIGHT SIMULATOR (102)** Be a jet pilot at the controls.
- ☐ **CHESS (GAM9)** Great. Many levels. Save and playback moves. 2-D or 3-D.
- ☐ **GLOBAL THERMAL NUCLEAR WAR (105)** Frightening.
- ☐ **ARCADE GAMES (106)** Has Kong, a 3-D Pacman, Bricks, Pango. (Requires color.)
- ☐ **BASIC GAMES (107)** Pacman, Lunar Lander, Startrek, Meteor, Breakout, and others.
- ☐ **CARD GAMES (109)** Bridge, canasta, hearts, poker, etc.
- ☐ **STRIKER (110)** Defender-like game. "Top Gun" in space.
- ☐ **FLIGHTMARE (112)** Futuristic fighter pilot game. (Requires color graphics adapter.)
- ☐ **CENTIPEDE (113)** Like the arcade game.
- ☐ **SLEUTH (117)** Who done it?
- ☐ **DND (119)** Like Dungeons and Dragons.
- ☐ **NEW TREK (121)** Battle the Klingons and Romulans.
- ☐ **GAMES IN BASIC (124)** Lander, biorhythms, desert, Phoenix, Star Wars, others.
- ☐ **TRIVIA GAME (130-131)** (Two disks) Extensive trivia game.
- ☐ **MONOCHROME GAMES (134)** Eight great games.
- ☐ **PROFESSIONAL BLACK JACK (148)** Become a pro.
- ☐ **ACTION GAMES (149)** Has Tank, Space War, etc. (CGA)
- ☐ **QUEST (152)** Role playing adventure fantasy game. (Requires color.)
- ☐ **MONOPOLY WITH GRAPHICS (118)** Color or monochrome.
- ☐ **BRIDGE PAL (171)** Complete game of contract bridge, with tutorial.
- ☐ **CRIBBAGE (173)** Also Pascal, Maze, Firefight, Slot, Vampire, etc. (Requires Basic)
- ☐ **18-HOLE MINIATURE GOLF (176)** Time honored game.
- ☐ **WHEEL OF MISFORTUNE (181)** Guess the word, spin the wheel and watch out!

EDUCATION

- ☐ **FUNNELS AND BUCKETS (201)** A fun way to learn basic math.
- ☐ **MATHPAK (202)** Turorial with lessons in higher math.
- ☐ **PC-TOUCH (204)** Typing tutor.
- ☐ **EZ-SPELL (206)** Checks spelling.
- ☐ **EDUCATIONAL PROGRAMS (207)** Preschool and elementary.
- ☐ **BASIC TUTORIAL (208)** Learn programming with BASIC.
- ☐ **BEGINNING SPANISH (211)** Tutorial.
- ☐ **BIBLEQ (214)** Learn the Bible with this tutorial quiz.
- ☐ **IQ BUILDER (216)** Test and strengthen your mind.
- ☐ **TUTOR (225)** Learn all about your PC, DOS commands.
- ☐ **PC STAR MAP (236)** Over 30 constellations by month, (Requires Basic and CGA)
- ☐ **ABC FUN KEYS (243)** Preschool. For learning letter concepts, alphabet and keyboard.

MUSIC

- ☐ **PIANOMAN 3.2 (301)** Turn your keyboard into a piano. Fun!
- ☐ **PC-MUSICIAN (302)** Compose, save, and play music.
- ☐ **CHRISTMAS SONGS (311)** Play your favorites on your PC.

WORD PROCESSING

- ☐ **PC-WRITE 2.71 (401-402)** (two disks) Latest version of this popular program. Includes spelling checker.
- ☐ **NEW YORK WORD (403-404)** (two disks) Easy yet powerful. Includes split screen editing, mail merge, etc.
- ☐ **LETTER WRITER (405)** The easy way to write letters! Popular.
- ☐ **PC-TYPE+ (421-423)** (3 disks) Excellent. Includes mail merge, a 100,000 word spelling checker. Interfaces with PC-File +, PC-Style.

SPREADSHEETS

- ☐ **EZ-SPREADSHEET (509)** Easy but powerful. Beginner and pro.
- ☐ **PC-CALC+ (512-514)** (3 disks) Jim Button's famous Lotus clone. Excellent.

SPREADSHEET TEMPLATES

- ☐ **LOTUS MACROS (601)** Save hours of work. (Requires Lotus 1-2-3)
- ☐ **LOTUS SPREADSHEET TEMPLATES (602)** Ready made. (Requires Lotus 1-2-3)
- ☐ **LOTUS TUTORIAL (630)** Great for learning Lotus (requires Lotus)

ACCOUNTING/FINANCE

- ☐ **PC-GENERAL LEDGER (701)** Popular accounting system.
- ☐ **MR. BILL (702-703)** (2 disks) Billing customers; invoices, client reports, audit trail.
- ☐ **CPA LEDGER (706-708)** (3 disks) Complete GL.
- ☐ **PC-STOCK (712)** Analyze market trends. Graphics.
- ☐ **PERSONAL FINANCE MANAGER (715)** Household budget manager. Track checking, savings, investments.
- ☐ **FINANCE MANAGER II (774-775)** (2 disks) For personal or small business financial management.
- ☐ **CHECKBOOK (752)** Complete system with online help.

DATABASE PROGRAMS

- ☐ **PC-FILE + 2.0 (801, 805, 837)** (3 disks) Rated better than dBase III+ by Consumer Reports. From Jim Button.
- ☐ **FILE EXPRESS 3.70 (803-804)** Powerful DB system that allows over 32,000 records. Sorts up to 10 key fields.
- ☐ **DBASE III ROUTINES (815)** Over 60 helpful dBase III routines.
- ☐ **WAMPUM (824, 825, 835)** (3 disks) dBase III clone. dBase III compatible.

GRAPHICS

- ☐ **KEYDRAW CAD (1001, 1002, 1065)** (3 disks) Popular. Also uses mouse. (Requires color graphics - CGA).
- ☐ **3-D (1003)** Create and edit 3-D objects. (Requires CGA.)
- ☐ **SIDEWAYS (1007)** Prints your text sideways.
- ☐ **ANIMATOR (1011)** Create animated pictures on PC.
- ☐ **SIMCGA (1027)** Use your Hercules card to run programs requiring color graphics on your monochrome.
- ☐ **READ MAC (1041)** Digitized pictures of Ashley, Cheryl, Brooke. ADULTS ONLY!

TELECOMMUNICATIONS

- ☐ **Q-MODEM 3.1 (1101, 1102, 1144)** (3 disks) Powerful but easy to use. Fast.
- ☐ **RBBS-PC (1107-1109)** (3 disks) Multi-user BBS.
- ☐ **PROCOM 2.42 (1112-1113)** (2 disks) Hacker's delight. Redial capability. Latest.

SECURITY/HACKING

- ☐ **UNPROTECT PROTECTED PROGRAMS (1202)** Make backups of protected software.
- ☐ **UNPROTECT II (1203-1204)** (2 disks) More ways to backup commercial software.
- ☐ **UNPROTECT III (1205)** Unprotect Softguard protection.
- ☐ **UNPROTECT IV (1206)** More programs to unprotect.

DOS

- ☐ **DOS TUTORIAL (1301)** Teaches you to use DOS.
- ☐ **DOS HELP (1302)** Convenient help when a problem arises.
- ☐ **STILL RIVER SHELL (1304)** Run DOS commands from a menu. Makes DOS easy.
- ☐ **BATCH FILE TUTORIAL (1305)** Utilize the batch processing capabilities of DOS.
- ☐ **DOS TIPS (1311, 1314)** (Two disks) Advanced tutorial.

BASIC

- ☐ **PC-PROFESSOR (1401)** BASIC tutorial.
- ☐ **BASIC PROGRAM GENERATOR (1402)** The menu driven way to write programs.
- ☐ **SWISS ARMY KNIFE (1406)** Tools for programming in BASIC.

APPLICATIONS

- ☐ **FORM LETTERS (1907)** Commonly used form letters and business applications.
- ☐ **EZ-FORMS (1908)** Make forms to meet different needs.
- ☐ **MAIL MASTER (1910)** Create mailing lists. Print letters.
- ☐ **ASTROLOGY 9.4 (1916)** Calculate chart. Prints wheel.
- ☐ **LOTTO (1941)** Chart strategies for picking lottery numbers.
- ☐ **LABEL MAKER (1965)** Multiple label maker. Great for mailing lists.
- ☐ **FAMILY HISTORY (2203-2204)** (2 disks) Create files and genealogical reports.
- ☐ **DR DATA LABEL (2327)** Powerful mailing list program. Customize labels to size and format.
- ☐ **CITY DESK (2513)** Simple desktop publisher.

UTILITIES

- ☐ **DESK COMMANDO (2607)** Better than Sidekick. Too many features to list.
- ☐ **EPSON PRINTER UTILITIES (2705)** Change print modes on Epson or compatibles.
- ☐ **LINCOMATIC BANNER MAKER (2714)** Creative banner making with multiple fonts.

RELIGION

- ☐ **THE BIBLE (3301-3306)** (6 disks) Old Testament.
- ☐ **THE BIBLE (3307-3308)** (2 disks) New Testament.
- ☐ **WORD WORKER (3309-3310)** (2 disks) Bible search program.

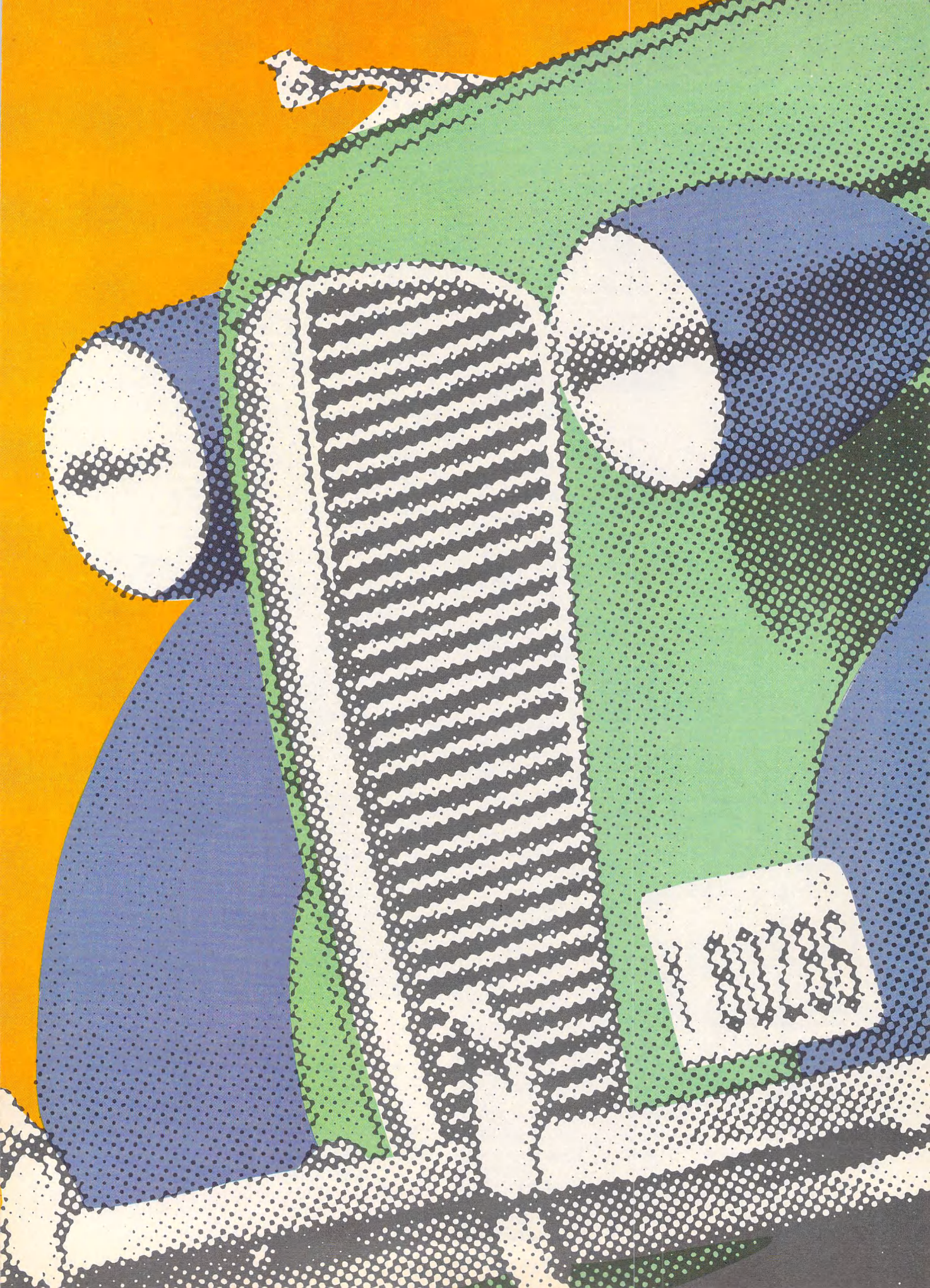
MICRO STAR

POST OFFICE BOX 4078 • LEUCADIA, CA 92024-0996

HOURS: Monday - Saturday 7 AM - 5:00 PM, Pacific Time
TERMS: We accept MasterCard, VISA, Checks (allowing 10 days to clear), Money Orders, and COD (add $4.00).
MINIMUM ORDER: 5 Disks, $3.49 per disk. Add $1 per 3½" disk.
SHIPPING: $3.50. Orders shipped out same or next day.
MAIL-IN ORDERS: Please include your name and address.

CALL TODAY FOR FREE CATALOG

800-444-1343
FOREIGN: 619-436-0130



LASER POWER

from Your Dot-Matrix Printer

George Campbell

Transform your dot-matrix workhorse into a printing superstar. With any of five currently available programs—and for as little as $25—almost any Epson-compatible 9-pin dot-matrix printer can produce output so clean and dark that your friends may think you've bought a $2,000 laser.

If someone told you that your 9-pin printer could produce near–*laser*-quality output, you'd probably laugh. But it *can*. There's a group of little-known programs that supercharge any Epson-compatible dot-matrix printer and create dazzling, laserlike output.

I looked at five of these programs and discovered powerful new life in my old 9-pin printer.

All these print enhancers work in a similar way: They convert text into graphics using special font files. When you print, they shift your printer into high-resolution graphics mode and produce high-quality type. Each program offers an assortment of fonts. You can even add headlines or use multiple fonts on a single page.

Enhancement Basics

Print enhancers aren't difficult to use. With some, you insert codes into your document to tell the program what you want to do. The codes are usually easy to remember. In one program, for example, you type \I to use italics. Another code, \i, returns you to normal print.

Once you've created your document, you save it as an ASCII file and print it using the print-enhancement program.

Other programs are even easier to use: You install these in your computer's memory, then forget them. When you print a document with your word processor, the program steps in and prints it in high-quality mode. You place codes in your document only if you need to change fonts.

Epson LX-86

Pica, Elite, Condensed, NLQ, WIDE, WIDE ITALIC BOLD, *Italic*, ***Bold Italic***, Underline, Double Underline, Superscript, and Subscript are some of the available modes. These options are not available in the NLQ mode.

There are some tradeoffs with print enhancers. High-quality printing is slower, and there is more wear and tear on your printer and ribbons. For these reasons, most users save these programs for important documents.

I put each program through a series of tests. First, I created a print sample, using as many features as possible. Those tests are reproduced here so that you can judge each program's quality.

Next, I created a business letter that took exactly one minute to print on an Epson LX-86 printer. I printed that letter with each program. You'll find the printing time in each program's review.

You probably won't find any of these programs on the shelf at your local computer store. In fact, since many of these companies are small, the programs can be hard to find through mail-order outlets.

Your best bet is to contact the publisher directly. For the shareware programs, you can get a trial copy on major bulletin boards or from shareware distributors.

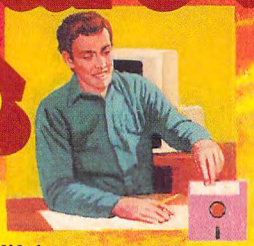
Bradford

Bradford is a shareware product. You can try the program out, then obtain a complete manual by paying the $25 registration fee.

This program operates in the batch mode, which means that you must include codes in your document to use its features. When you've finished, you print the file

Make Any Computer Do Exactly What You Want With McGraw-Hill's

Contemporary Programming & Software Design Series

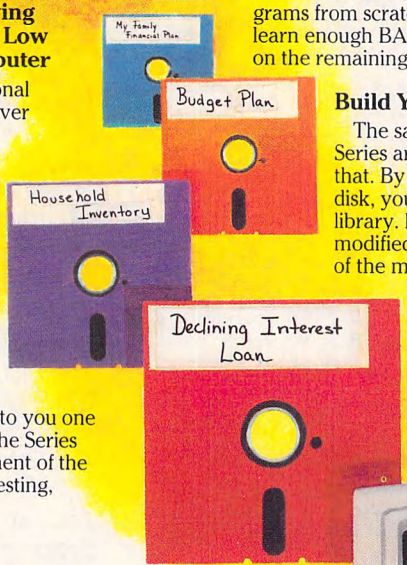


From Writing Your Own Programs to Modifying Existing Software, Here's the New, Easy, and Low Cost Way to Unlock the Secrets of Your Computer

Whether you use computers for business, for personal applications, or for fun, off-the-shelf programs will never do everything you want them to do for you. That's because they were written by programmers to satisfy what they perceived as the needs of the greatest number of potential users—often missing some or many of your specific needs.

That's why McGraw-Hill's new Contemporary Programming and Software Design Series teaches you how to create your own software . . . either from scratch or by making key modifications to existing programs.

There is nothing magical about it. You learn the process of building a computer program step-by-step with McGraw-Hill *Concept Modules* sent to you one at a time, once a month. Each of the ten modules in the Series takes you through an important step in the development of the structure and detailed logic of a program, including testing, debugging, and documentation.



Unique Interactive Hands-On Instruction

Each module includes an easy-to-understand guide PLUS a 5¼" floppy disk containing typical programs and interactive instruction that you can run on IBM PCs, PC compatibles and Commodore 64 and 128 computers for hands-on experience.

In the first Module, for example, when your sample program (Declining Interest Loans) appears on your screen, you'll find errors on certain program lines. You'll also see that the program is only three-quarters completed.

Now comes the fun part. You'll discover how this program is built, and in the process you'll learn how to identify and correct errors. And by the end of Module 1, you'll actually have completed this program yourself.

But there's more. Special graphics on your screen work in conjunction with the accompanying guide to amplify, illustrate, and deepen your understanding of software design principles.

The Crucial 95%—Learn the Foundation of Computer Programming

While the Series includes interactive disks that run on specific computers, everything you learn you can apply to any language or machine. Why is this possible? Because McGraw-Hill knows programming is far more than coding a program into the computer using a specific language. In the real world of computers, 95% of the programming process is carried out using design techniques that are independent of specific language or machine. It is this crucial 95% that you thoroughly understand and master in the Series.

Make no mistake. Almost all books and courses on "programming" teach you only the final 5% of the total programming process—namely, how to code in a specific language . . . information of little value if you don't know how to reach the point in the programming process when you are ready to code.

With the Series, however, you'll learn to create your own programs from scratch, even modify off-the-shelf programs. You'll learn enough BASIC and machine language to get you started on the remaining 5% of the programming process.

Build Your Own Personal Software Library

The sample programs you work with throughout the Series are excellent learning tools. But they're more than that. By combining the sample programs onto one master disk, you'll have the start of your own personal software library. In addition to the programs you've written and modified throughout the Series, you'll also receive dozens of the most popular public domain and user-supported programs, such as data base manager, word processor, calendar generator, appointments reminder and much, much more.

15-Day No-Risk Trial

To order your first module without risk, send the attached card today. Examine the first module for 15 days and see how the Series will help you make your computer do exactly what you want it to do!

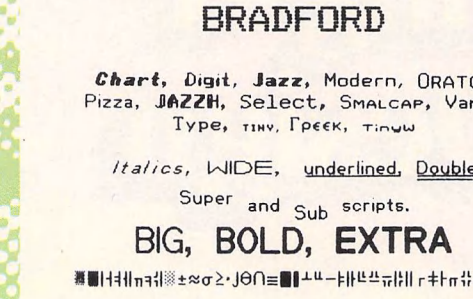
If someone has beaten you to the card, write to us for ordering information about the Contemporary Programming and Software Design Series.

McGraw-Hill
Continuing Education Center
3939 Wisconsin Avenue
Washington, DC 20016

with the *Bradford* program.

The manual provided with the shareware version is limited, but a sample file lets you see how the codes work.

Bradford includes 41 fonts and uses three passes of the printer's head for each line. You can print in a variety of styles, including boldface, double width, superscript, and subscript.



Bradford's easy-to-remember formatting codes not only select different fonts but also control page layout. The program can justify your document, center lines of type, and set margins. The program also includes a font editor that lets you alter a font or even design one from scratch.

Print quality is good, with just a trace of dottiness on some letters. All fonts are available at all times, with a limit of five fonts on a single line. A special graphics font contains graphics and line-drawing characters.

When I prepared the print sample for *Bradford*, I couldn't align columns with mixed fonts, but that's an unusual situation.

Bradford's printing speed is typical. Printing the 47-line business letter took 4 minutes, 18 seconds.

The program supports Epson, Star, Panasonic, IBM, Seikosha, and Citizen 9-pin printers, plus other Epson-compatible printers.

Fancy Font

Fancy Font, from SoftCraft, is by far the most complex and versatile of these printer-enhancement programs. Its print quality beats them all, with resolutions of as many as 216 × 240 dots per inch. You can even include reverse printing and graphics files in your documents.

That quality, however, comes at a price. Printing with *Fancy Font* takes much longer than it does with the other programs. Printing the sample letter took 12 minutes, 36 seconds.

To use *Fancy Font*, you include special commands in an ASCII text file to select fonts, page layouts, and other formatting features. Simple documents need very few commands, but complex layouts need many. All commands use the backslash character followed by a command. For example, to turn

Fancy Font
Roman from 8 pt. to 24 pt.
Times from 11 pt. to 34 pt.
SanSerif, 12 pt. + Bold and Italic
Courier from 10 pt. to 20 pt.
Helvetica, 16 pt. + Bold and Italic
Old English, 20 pt.
Script, 20 pt.

justification on, you use the command \j. To turn it off, the command is \k.

The program's manual is complete and includes a tutorial section to get you started. A separate manual explains the font-editing program. The program comes with a catalog of additional fonts available from SoftCraft.

Fancy Font comes with 18 fonts, ranging in size from 8-point to a headline-sized 34-point font. Italics and boldface require separate fonts. Additional font disks are available, each containing several fonts. The number of fonts available from SoftCraft is staggering.

If you use *Microsoft Word* or *WordPerfect*, you can buy special versions of *Fancy Font* that use those programs' built-in formatting features. These versions, *Fancy Word* and *Fancy Font for Word Perfect*, eliminate the need for embedded commands. Separate versions of all these programs are available for Epson FX- or MX-compatible printers.

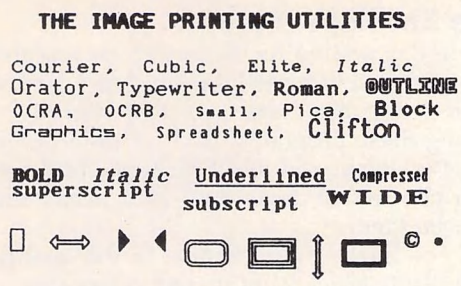
The Image Printing Utilities

The Image Printing Utilities, from Image Computer Systems, offers two approaches to high-quality printing on Epson-compatible printers. You can use IP, a batch mode utility, to print your saved ASCII documents, or you can use Metatext, a memory-resident program, to print your documents automatically from your word processor.

IP works like the other batch-oriented programs discussed here. You include backslash (\ ) commands to change fonts and other print features. IP commands are mnemonic—that is, easy to remember.

The second program, Metatext, is memory-resident. It intercepts text sent to your printer and converts it into Image Printing format. It can take as much as 120K of RAM if you load eight fonts, but you can remove it from memory with a simple command.

If your word processor includes commands for boldface, italics, and other printing features, Metatext recognizes those commands as they're sent to the printer. I tested the program with *Microsoft Word*, and my documents printed just as I had formatted them. With Metatext, you don't need to learn or use any special codes.



The Image Printing Utilities includes 15 fonts, each of which can be printed as italics, boldface, compressed, wide, super- or subscript, underlined, or any combination of those attributes. A special graphics font lets you print graphics characters plus a unique set of line-drawing and other characters.

All 15 fonts can be used with IP in a single document, while Metatext can load only 8 fonts into memory at once. You change fonts with backslash commands.

The software's manual shows all the typefaces and offers an easy-to-read summary of commands. The package supports all 9-pin Epson printers, plus IBM-compatible Okidata, Canon, Citizen, NEC, Panasonic, Star, Tandy, and Toshiba printers.

The program can print in one-pass draft mode (for speed), in three-pass mode, or in six-pass mode. Use the six-pass mode to compensate for a fading ribbon. The print quality is excellent. Printing the sample letter in three-pass mode took 4 minutes, 31 seconds.

A shareware version of IP, with only one font, is available on CompuServe and GEnie with the filename IP.ARC.

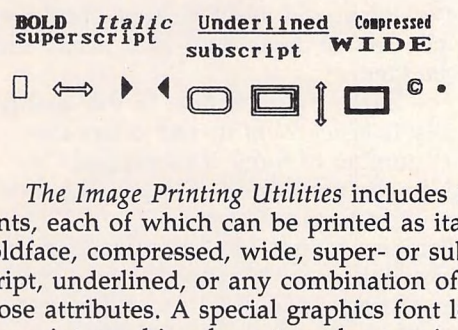
Lettrix

Lettrix is another memory-resident printer-enhancement utility with excellent features. The program includes 22 fonts, all of which can be printed in several ways. Aside from normal English fonts, *Lettrix* includes Greek, Hebrew, and Russian fonts. Several decorative fonts are available for special effects.

Graphics characters are included in the Courier, Gothic, Prestige, and Folio fonts, allowing you to create boxes and forms. Finally, the Science and Formula fonts can add scientific and math characters to your documents. An easy-to-use font editor is also included.

The program's manual does a good job of explaining the program and includes charts illustrating foreign language and symbol fonts.

You load *Lettrix* and as many as seven separate fonts into your computer's memory. It uses 80K and can't be removed without rebooting. A hot-key combination pops a menu onto the screen at any time, letting you choose typefaces or character attributes. Anything sent to the printer will be printed using the *Lettrix* interface, but you can shut off the program from the menu, returning your printer to its normal mode.



Lettrix uses backslash commands to control features such as justification, line spacing, print spacing, and print size.

The *Lettrix* manual includes information on using the program with many popular word processors. In many cases, internal word processor commands for underlining, italics, and other features control *Lettrix* automatically.

I encountered one difficulty in using *Lettrix* with *Microsoft Word,* version 4.0. The special printer drivers included for *Word* were written for *Word* 2.0, so I had to alter them before they would work with version 4.0.

Print quality is good but shows some dottiness. Normal printing uses two passes of the printhead. In that mode, *Lettrix* printed the 47-line sample letter in 2 minutes, 11 seconds.

LQ

LQ is available from shareware distributors and bulletin boards, with the filename LQALL.ARC. The shareware version contains the entire program, including all fonts and the complete user's manual.

LQ is a memory-resident (100K) program that intercepts all output to the printer and converts it into high-quality printing. It's compatible with any printer that emulates the IBM Graphics Printer. If your printer is Epson or IBM-compatible, it will work with *LQ*.

LQ includes 23 fonts, but the EDCHAR program included in the package lets you create new ones. Four fonts can be loaded into memory at one time, but you can replace those fonts without reloading the program. You can also remove *LQ* from memory without rebooting.

Microsoft Word users must run a small .COM file before using *LQ*, or *Word* will lock up and refuse to run.

With *LQ*, you use your word processor as you normally do. *LQ* automatically translates boldface and other character attributes as it prints.

This handles most printing chores. To use all the features of *LQ*—such as triple-high characters—and to change fonts, you must insert codes containing the escape character (ASCII 27) in your document. This method of controlling the printer makes *LQ* harder to use than the other programs.

Consult your word processor's manual for instructions on inserting printer control codes. In many cases, holding down the Alt key while you type 27 on the numeric keypad will embed the escape character.

Text-editing programs, like *SLED* (*COMPUTE's PC Magazine*, January 1989), can usually insert printer control codes. Use one of these programs if your word processor can't handle them.

Print quality for *LQ* is good, with a little dottiness showing in some fonts. Its triple-high text was not as clear as the other programs' large fonts, and the use of separate italic fonts was inconvenient at times. *LQ* took just over four minutes to print the sample letter in three-pass mode.

The Envelope, Please....

While I'm waiting for the envelope's address to be printed in near–laser-quality, I honestly have to say that there's no clear winner among these programs. Each offers a unique set of features, and all of them perform well. Your choice will depend on your needs and your budget.

The hands-down winner in the quality category is *Fancy Word*. It also offers the largest number of fonts. This program is, however, the most difficult to use, the most expensive, and the slowest.

For ease of use, *The Image Printing Utilities* takes the prize. It's almost totally transparent, letting you use your word processor's commands with almost no changes.

LQ and *Bradford* are the most economical. Both provide good quality for a low price. Best of all, you can try them at no cost, since they're shareware programs. **PC**

For more information about the products discussed in this feature, contact the publishers at the addresses listed below:

Concom Enterprises
P.O. Box 5056
Champaign, IL 61820

Granny's Old-Fashioned Software
Rt. 4, Box 216
Boone, NC 28607
(704) 264-6906

Hammerlab
938 Chapel St.
New Haven, CT 06510
(800) 351-4500; in Connecticut, call (203) 624-0000

Image Computer Systems
P.O. Box 647
Avon, CT 06001
(203) 678-8771

SoftCraft
16 N. Carroll St.
Suite 500
Madison, WI 53703
(800) 351-0500

Fast Features: Print Enhancers

Product	Company	Price	Mode	Number of Fonts Available	Benchmark Speed	Quality	Printers Supported	Comments
Bradford	Concom Enterprises	$25.00—manual only; $39.95—manual and latest version on disk	Batch	41 fonts	4 minutes, 18 seconds	Good	Epson, Star, Panasonic, IBM, Seikosha, Citizen, and compatible	Font editor included; a shareware version—BRADFORD.ARC or BRAD2.ARC—is available.
Fancy Font	SoftCraft	$180	Batch	18 fonts	12 minutes, 36 seconds	Superior	Epson FX, MX, and compatibles	Additional font disks available for $15 each. *Fancy Word*—$140—and *Fancy Font for Word Perfect*—$210—are also available.
The Image Printing Utilities	Image Computer Systems	$89.95	Memory-resident (Metatext)—uses 60–120K; batch (ImagePrint)	15 fonts	4 minutes, 31 seconds	Excellent	Epson, IBM, Okidata, Canon, Citizen, NEC, Panasonic, Star, Tandy, Toshiba, and compatibles	A shareware version—IP.ARC—with one font is available.
Lettrix	Hammerlab	$98.50	Memory-resident—uses 80K	22 fonts	2 minutes, 11 seconds	Good	Epson and compatibles	Font editor included. Scientific and math characters included.
LQ	Granny's Old-Fashioned Software	$35 for full registration or $10 to receive a shareware trial disk	Memory-resident—uses 100K	23 fonts	4 minutes	Good	Epson, IBM Graphics Printer, and compatibles	Font editor included.

THE DEFINITIVE MAGAZINE AND DISK FOR PC USERS

COMPUTE!'s PC MAGAZINE

BACK ISSUES

Note:

- *Selected titles are listed under contents for each issue*
- *3½-inch disks available for some issues*
- *Programs requiring more than 256K or a color monitor are so noted*

COMPLETE YOUR COLLECTION!
ANY ISSUE JUST $16

Issues not listed are sold out. Limited quantities available.

ORDER TODAY

January 1988, Issue 3, Vol. 2, No. 1

Features

Trapping Disk Errors in Turbo Pascal: Cut debugging time in half
A Winter's Tale: *Flight Simulator* adventure

Software on Disk

PC-Art: Full-featured drawing program (CGA or EGA)
EZDOS: Powerful DOS enhancer
RoboKey: Teach your PC to execute commands by itself
Wrimage: Educational word game (CGA)
Keyboard Lock-Out: Secure your computer while you're away
Burger Blaster: Zap flying hamburgers in this fun-filled action game (CGA)

March 1988, Issue 4, Vol. 2, No. 2

Feature

Flying Home: *Flight Simulator* adventure

Software on Disk

TheDraw: Design custom menu screens, presentations, or animated sequences
Tonto!: Pop-up with ASCII chart, clock/calendar, directory, hex converter, keyboard scan code reader, and printer setup
Font Typesetter: Add zest to your printouts with 21 fonts (CGA)
Designing Custom Fonts: Create your own fonts for Font Typesetter (CGA)
FileFinder: Locate any file, in any directory, in seconds
SuperTiler: More power for the BASIC PAINT command (CGA)
Hover: Sail through the air in this futuristic tennis game (CGA)
DOS Help: Call a help screen for any DOS command

May 1988, Issue 5, Vol. 2, No. 3

Feature

Advanced Spreadsheets: Special techniques for power tools

Software on Disk

Quick Scheduler: Organize yourself!
Source Code XREF: Debugging made easy
Text File Compare: Find out which file is which—*fast*
WHOA!: Interactively control your PC's speed (EGA not supported)
Las Vegas Solitaire: Solitaire with casino rules
States & Capitals: Learn U.S. geography and have some fun (CGA)
QikServe: Arcade action in a fast-food setting (CGA)

July 1988, Issue 6, Vol. 2, No. 4

Features

How to Build Your Own PC Clone: Expert advice on a money-saving alternative
In Praise of PC Play: The PC blasts into the game market
Talking to Your Printer: Make your printer do all its tricks
Buyer's Guide to Simulation Software: 38 exciting games put you in command

Software on Disk

JLSCAN: Super file lister
Presentation Graphics: Create professional-looking graphs and charts (CGA)
File-It: Save text screens to disk
Graphics Shape Editor: Design your own graphics for games (CGA)
Ancient Empires: The glory of battles past (CGA)
Power Poker: An old favorite with a new twist

September 1988, Issue 7, Vol. 2, No. 5

Features

IBM Shakes Apple's Tree: PCs invade the classroom
How to Install a 3½-Inch Drive: A few household tools and half an hour are all you need
CD-ROM—New Horizons for PC Users: CD-ROMs become a viable storage medium
DeskMate—Windows for the Rest of Us?: Hands-on guide to Tandy's new operating environment
Buyer's Guide to Software for Teachers and Coaches: 29 packages to help any school's staff

Software on Disk

Ample Notice: Never miss another appointment (512K)
Three-Dimensional Shapes: Create, view, and move 3-D objects (CGA)
Arcade Baseball: Electronic version of America's favorite pastime (CGA or EGA)
Stream Search: Find that string!
Screen Editor: Create eye-catching screens for batch files or BASIC (CGA)

November 1988, Issue 8, Vol. 2, No. 6

Features

How to Organize Your Hard Disk: Easy-to-use DOS commands to fine-tune your hard disk
Top 10 Tools for Your PC: Software our editors like and why
Hard Disk Utilities—Getting Started: Introduction to essential utilities
PC-Link—A Quantum Leap: New telecommunications service for PC users only
Buyer's Guide to Disk Performance Software: 21 comprehensive packages, caches, and optimizers

Software on Disk

MealMaster: Menu-driven recipe database
Programmable Printer Popup: Maximize your printer's performance
TimePark: Insurance against hard disk disaster
Ultima21: Blackjack like you've never played it
Stars: Interactive star chart (CGA)
SolarPix: See the solar system in motion (CGA)

January 1989, Issue 9, Vol. 3, No. 1

Features

Upgrading to an AT-Class PC for Less Than $400: Move into the fast lane
Do Your Taxes with Your Spreadsheet: Let your spreadsheet do the work
A Close-Up Look at DOS 4.0: Hands-on tour of IBM's new operating system
Buyer's Guide—Financial Management: 59 programs to manage your assets

Software on Disk

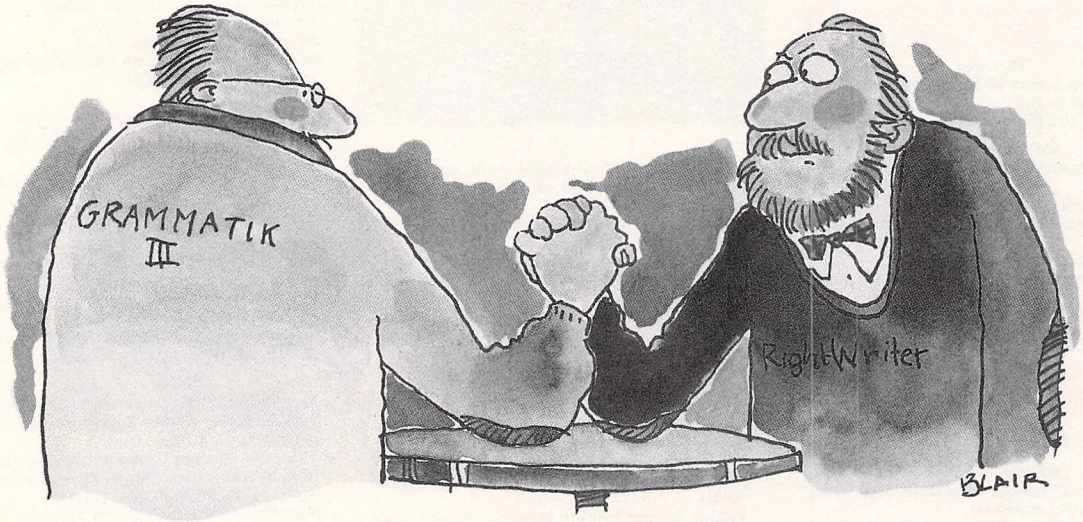
Pro Football: Coach your own team to a season championship (CGA)
Bounty Hunter: The chase is on! Find the crook . . . and learn U.S. geography
Disk Navigator: Sail through disk management
Stack: Recall any command, anytime
Move: Make your files go where you want them to
Off Road: Blast through Baja in a 4 × 4 (CGA)
Sled: Fast, powerful text editor
Flush: Send TSRs packing

FOR ORDER INFORMATION AND FORM, SEE PAGE 12.

Grammar Checkers Battle It Out

Grammatik III vs. *RightWriter*

David English



Saying goodbye to grammar problems may sound too good to be true, but there's a new class of PC software that can actually improve your writing style and help you develop a better critical eye. In this feature, two of the hottest PC grammar checkers go head to head, with results that are guaranteed to surprise you.

Let's face it: Writing is hard work, and most of us could use a little help. We write, rewrite, and rewrite again, but we still make mistakes. Half the time we don't even know what to look for. If we can put a man on the moon, why can't our PCs help us write better? Don't despair—now you can get professional help. No, I'm not talking about applying to the Famous Writer's School. I'm talking about *Grammatik III* and *RightWriter*, two PC grammar checkers.

Computerized grammar checking traces its family tree back two decades to *Writer's Workbench*, developed by Bell Laboratories to improve its own documentation. *Writer's Workbench*, which runs on a UNIX-based minicomputer, is a series of proofreading and language-analysis programs that run individually or together. Besides checking spelling and punctuation, *Writer's Workbench* checks the document's sentence structure and organization, and it can be customized for particular styles of writing.

Grammatik III and *RightWriter* have much of the power of *Writer's Workbench*. They can look for literally hundreds of problems, including passive voice, incomplete sentences, split infinitives, improper use of verbs and pronouns, long sentences, jargon, and clichés. To a much lesser degree, they can evaluate your writing and make recommendations about overall readability.

The Right Stuff

RightWriter from RightSoft uses over 4000 rules to make its recommendations on grammar, style, word usage, and punctuation. Unlike *Grammatik III*, *RightWriter* doesn't allow you to edit your document while still in the program. Instead, it creates a second document, or marked-up copy, with a suggested correction placed after each possible problem. You then use your word processor to edit the marked-up copy and use *RightWriter* once again to remove the notations for a final cleaned-up document.

The marked-up copy also contains a summary, which gives a general critique of the document with indexes rating the document's readability, strength of delivery, use of descriptive language, and use of jargon. At the end of the summary, you'll find a list of words to review, including words that may be slang, jargon, often misused, or too difficult for most readers to understand.

RightWriter is compatible with most of the popular word processors. With many word processors, *RightWriter* automatically identifies the word processor when it reads the file. These include *WordPerfect, Microsoft Word, MultiMate, XyWrite, OfficeWriter, IBM Writing Assistant, PFS:First Choice, PFS:Professional Write,* and *PFS:Write.*

With other word processors—such as *WordStar, PC-Write, New Word, Bank Street Writer, Volkswriter, PeachText 5000, Edix,* and *SideKick*—you must first tell *RightWriter* which word processor you're using. You can also work with any word processor that can save its documents in ASCII format. You can view or print the marked-up copy, but you won't be able to edit the marked-up copy with your word processor. Instead, you use your printed output to help you edit the original.

Version 3.0 of *RightWriter* adds a menu interface that lets you use the cursor keys to easily make selections, a choice of writing styles that lets you set both the educational level (General Public, High School, or College) and the type of writing (General Business, Technical, Report/Article, Manual, Proposal, or Fiction), and the ability to modify the dictionary of jargon, colloquial, misused, and negative words (in prior versions this was done with a separate *RightWords* program). With *RightWriter*, you can turn specific rules on or off.

Grammar School

Reference Software claims that the original *Grammatik* was the first style checker for personal computers. Like *RightWriter, Grammatik III* proofreads your documents and makes recommendations on grammar, style, word usage, and punctuation.

Where *RightWriter*'s advertising stresses its 4000 rules, *Grammatik III* emphasizes its artificial intelligence. Reference Software even goes so far as to guarantee that *Grammatik III* will improve your writing in 30 days or you can get your money back. (*RightWriter* has recently responded by offering the same money-back guarantee.)

Grammatik III corrects your document interactively by allowing you to see and change mistakes while still inside the program. (This is much more convenient than *RightWriter*'s procedure, where you have to save a marked-up copy, go to your word processor to edit the changes, and then return to *RightWriter* for a final cleanup.)

After editing your document, *Grammatik III* saves your corrected copy in your word processor's format. It supports 26 word processors, including all of the popular ones, as well as any word processor that can read and write ASCII files. (*Grammatik III* wins a few points here for supporting a larger number of word processors.) Like *RightWriter, Grammatik III* is menu based and easy to use, and it allows you to turn its rules on and off.

Grammatik III doesn't offer *RightWriter*'s choice of writing styles for educational levels and types of writing, but by the time you read this, you should be able to buy Reference Software's optional *Power Pack.* It

contains a memory-resident version of *Grammatik III* (this will make the program convenient to use, but will require 150K of available memory), a phrase editor (which *RightWriter* includes at no additional cost), and a program that compares your documents to several standard works, including the Gettysburg Address, a Hemingway short story, and an insurance policy (or you can create your own standard works).

Reference Software also offers an optional *Reference Set Library* that contains an 83,000-word *Random House Concise Dictionary* and a 300,000-synonym *Reference Thesaurus*. You can use the 83,000-word dictionary to replace *Grammatik III*'s 50,000-word dictionary for a larger spelling dictionary.

Other *Reference Set* dictionaries include *Stedman's Medical Dictionary, Black's Law Dictionary,* and various foreign language dictionaries. (*RightWriter* doesn't check your spelling—its modifiable dictionary is made up of unacceptable words, such as jargon, slang, and misused words, rather than the acceptable ones found in a spell checker.)

To Err Is Human

To test the grammar checkers, I analyzed ten contemporary documents, running the same ten texts through each program. The documents included two press releases from Passport Designs and Toshiba, two technical notes from Adobe and Aldus, one article and one ad from the *New York Times*, one article and one ad from the *Wall Street Journal*, one unedited review submitted to *COMPUTE!'s Gazette*, and one edited review published in a recent *COMPUTE!'s PC Magazine*. The documents varied in length from 266 to 3922 words.

Numbers You Can Count On?

Benjamin Disraeli once said, "There are three kinds of lies: lies, damned lies, and statistics." Both *RightWriter* and *Grammatik III* provide a battery of statistics, tabulated in precise measurements—in the case of *RightWriter*, to the accuracy of three decimal places.

It turns out that the two programs share most of the same indexes and statistical yardsticks. These include three readability indexes—the Flesch Reading Ease Score, which focuses on the average number of words in a sentence; Gunning's Fog Index, which concentrates on words with more than two syllables; and the Flesch-Kincaid formula, which the Department of Defense uses to determine the average number of school years needed to understand training manuals and other writing. Both programs also count the number of words in a document and calculate the average number of words per sentence.

I assumed that the two programs would generate about the same set of numbers for the same writing sample, but when I checked the statistics generated by the two programs from the ten sample documents, none of the numbers agreed. In fact, the differences were dramatic. Even more puzzling, the word counts and average words per sentence were significantly different. So why the difference, and which program is more accurate?

With the *Wall Street Journal* ad, *RightWriter* counted 235 words and *Grammatik III* counted 219 words. A much slower human counted 222 words. With the *New York Times* article, *RightWriter* found 273 words, *Grammatik III* found 256 words, and our tireless human found 272.

The biggest discrepancy came with the Toshiba press release, with *RightWriter* and *Grammatik III* counting 958 and 806 words, respectively. This particular article contained many numbers and hyphenated technical words, which appeared to account for most of the difference.

In every case, *RightWriter* counted more words in the document than *Grammatik III*, with the human count falling somewhere in between. After tabulating all the numbers, and despite the consistent differences between the two programs, neither program was much closer to the human count than the other. In other words, both are about equally inaccurate.

Like the word count, the Gunning's Fog Index was consistently lopsided, with *RightWriter* showing a number about 50–80 percent larger than the number given by *Grammatik III*.

With the Flesch-Kincaid grade level, *Grammatik III* agreed with *RightWriter* five out of ten times, it was one grade higher three times, and it was two grades higher twice. (In one instance, *Grammatik III* picked the 12th grade, *RightWriter* selected the 11th grade, and COMPUTE!'s own Atex minicomputer system chose the 10th grade.)

The Flesch Reading Ease Score and average words per sentence were also significantly different, but not in any consistent direction.

As you can see, each grammar program has its own way of counting numbers. Despite these comparisons, don't feel as though you shouldn't use the programs' statistics to help you edit your writing. Just keep in mind that each program uses its own set of algorithms to quickly approximate a value.

When using either program, the statistics can be useful in comparing one document with another. But don't take the numbers too seriously—even if they're carried out to three decimal places.

Both programs found a wide variety of errors in each of the articles, including quite a few false errors in the edited articles from the *New York Times* and the *Wall Street Journal*. As is true of any grammar checker, both programs were overzealous in their attempt to find mistakes. Like two junkyard dogs searching for bones, they turned over just about anything in sight.

RightWriter thought the sentence *For example, set left tabs at every inch beginning with .125 inch to position the numbers at the left side of each grid square* was actually two sentences—the first flagged as improperly ending with a preposition *(with)*. It also flagged the phrase *The T1600 has an on-board 20MB hard drive* and asked if *an on* was correct. When a laptop computer's dimensions were given as *12.2" × 3.2" × 12.5"*, *RightWriter* asked if a quotation was left unclosed. It also flagged the phrase *arcade games* and labeled *games* as colloquial.

Grammatik III had its share of false calls, too. It saw the typeface name *Stone Sans Serif* and suggested that *Sans* may need to be possessive. It thought the same of *DOS*, as in *MS-DOS 3.3*. With the phrase *stock market indicators*, Grammatik III thought that *indicators* should be replaced with a form of *show* or *suggest*. The phrase *your teaching* brought on the comment that the context of *your* indicates you may have meant *you* or *you're*.

Fortunately, both programs also found many genuine mistakes that even a careful writer might have overlooked. *RightWriter* suggested that a sentence not begin with *The fact that;* that the words *and/or* be omitted as being legalese; that *Its a tool* become *It's a tool;* that *"it's so fast"*, become *"it's so fast,"* (in this case, the comma did belong inside the quotation marks); that usage of words like *powerful, best,* and *definitely* may not be justified; that *chair* or *chairperson* replace *chairman;* that the simpler *check, test,* or *rate* replace *evaluate;* and that *as* replace *just as*.

Grammatik III suggested correctly that the first word of a sentence be capitalized, that *and* be used sparingly to start a sentence, that a sentence not begin with *The fact that* (it said *omit and state the fact),* that *very* replace *extremely,* that *all the materials* replace *all of the materials,* that a space be placed between a period and the first word of the next sentence, that the writer think twice about using the word *fantastic (fantastic means unbelievable, not terrific,* it said), and that *clearly* be used sparingly, if you mean *obviously* or *decidedly*.

Both programs did an excellent job of finding passive voice and long sentences, but both found too many incomplete sentences and missing verbs whenever a document moved away from a strict business, letter, or article form. *Grammatik III* found more mistakes than *RightWriter,* but with a higher percentage of false mistakes. Each program also found some genuine mistakes that the other had missed.

I also ran the *New York Times* article through each *RightWriter* style selection. Most of the recommendations were consistent across the board for all six styles. In each style, *RightWriter* suggested splitting a long sentence into two shorter sentences and questioned whether the phrase *the only two remaining steam* was ambiguous (the complete phrase read *the only two remaining steam powered railroads in Argentina*—not ambiguous at all).

The program flagged a passive-voice problem with General Business, Manual, and Fiction styles, but not with Technical, Report/Article, or Proposal. On all but Technical and Report/Article, *RightWriter* suggested that the simpler *route* or *schedule* replace the word *itinerary* and the simpler *buy* replace the word *purchase*. It also flagged a 27-word sentence as too long with General Business and Manual styles, but not with the others.

All styles flagged a sentence with 37 words as too long. In general, the styles seem to agree about 85 percent of the time, with small variations.

If you choose *RightWriter,* you may want to experiment with the styles and see which one suits your own style of writing best.

Fast Features: Grammar Checkers

	Grammatik III	*RightWriter*
Company	Reference Software	RightSoft
Price	$99.99	$95.00
Requirements	512K; hard disk recommended	384K; two floppy drives or one floppy and one hard drive
Mode	interactive (optional RAM-resident version available)	batch
Spelling checker	yes; additional dictionaries available at extra charge	no
Styles	no; *Power Pack* ($29.00) needed	yes
Modify phrase dictionary	no; *Power Pack* ($29.00) needed	yes
Guarantee	30-day money-back	30-day money-back
Media	5¼- and 3½-inch disks available	5¼- and 3½-inch disks available

False Alarms

Both programs do an adequate job of finding mistakes—just be prepared to wade through many more false alarms than genuine errors. While each program finds different mistakes, the two overlap so much that it's nearly impossible to recommend one program over the other for a particular style of writing. (Even though *RightWriter* stresses its usefulness for business writing, neither program is any better suited to analyzing business documents.)

In making your decision, look instead at the features each program offers. If you feel that the ability to select a writing style and add words to the word list is important, you should favor *RightWriter*. If you prefer an interactive editor and the option of a RAM-resident version (at some additional cost), you should choose *Grammatik III* instead.

Most people who write casually, and even some who write professionally, could use either program to improve their writing, since both programs essentially do the same job. If nothing else, they make excellent educational tools.

When instructed often enough about not using the passive voice, sentences that are too long, or sexist language, you begin to internalize the rules so that you soon become your own grammar checker.

Both programs still have a long way to go. Like a spelling checker that has too few words in its dictionary, *RightWriter* and *Grammatik III* find too many false mistakes that take too much time for you to consider. Even if you find only one real mistake among the ten false alarms, they may still be useful for those times when your writing must be of the highest quality.

In the future, grammar checkers will be even easier to use and more adept at finding mistakes. When that happens, we'll all probably be using them. Until then, PC owners who are willing to put up with the minor annoyances of *RightWriter* or *Grammatik III* will be rewarded with better writing and a keener eye for stylistic errors.

For more information about the products discussed in this feature, contact the publishers at the addresses listed below:

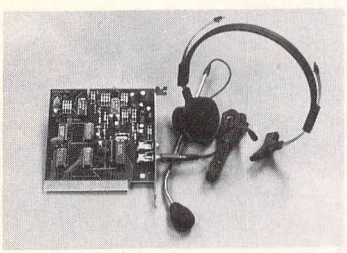
Reference Software
330 Townsend St.
Suite 123
San Francisco, CA 94107

RightSoft
4545 Samuel St.
Sarasota, FL 34233

PC

VOICE MASTER KEY®
VOICE RECOGNITION SYSTEM
FOR IBM, PC, XT, AT AND COMPATIBLES

GIVES A NEW DIMENSION TO PERSONAL COMPUTING . . . The amazing **Voice Master Key System** adds voice recognition to just about any program or application. You can voice command up to 256 keyboard macros. Requires under 64K. Instant response time and high recognition accuracy. Works with CAD, desktop publishing, word processor, spread sheet, games, even other TSR programs! **Voice Master Key** can also be called from within a program for adding voice recognition to custom applications. **A genuine productivity enhancer.** Easy and fun to use—the manual has you up and running in under an hour. A price/performance breakthrough equal to other systems costing $$$ more!.



ALL HARDWARE INCLUDED
Consists of a short plug in board that fits in any available slot. External ports include microphone and line level inputs. High gain flat response headset microphone included. **High quality throughout.**

ONLY $129.95 COMPLETE

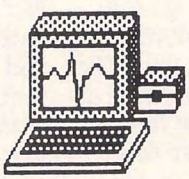
ORDER HOTLINE: (503) 342—1271 Monday-Friday, 8 AM to 5 PM Pacific Time

Add $5 for shipping and handling on all orders. Add an additional $3 for 2nd day delivery. All goods shipped UPS. Master Card and VISA, money order, cashiers check or personal checks accepted (allow a 3 week shipping delay when paying by personal check). Foreign inquiries contact Covox for C&F price quotes. Specify computer type when ordering. 30 DAY MONEY BACK GUARANTEE IF NOT COMPLETELY SATISFIED. ONE YEAR WARRANTY ON HARDWARE.

Call or write for FREE product catalog.

COVOX INC.
675-D Conger Street, Eugene, OR 97402
Telex 706017 (AV ALARM UD)
TEL: 503-342-1271 FAX: 503-342-1283

1988 Antic Award Winner "Outstanding Product"



The ACLS Teaching Series featuring

Cardiac Arrest!

An Incredible Simulation

IBM, Apple II+/c/e/gs, Atari XE, Atari ST

Don't let our low costs fool you! You've never seen anything this good on desktop computer. Not an IF-THEN or choose A,B,C-type program, Cardiac Arrest! is a mathematically-based simulator. You interpret the history, on-screen EKG, lab data, and vital signs, then give treatment orders in plain English.

Antic: "Impressive and amazingly complete. Information packed manual."
ST World: "Both highly educational and fun. Remarkably easy to use."
Computer News for Physicians: "This program series is excellent value."

Cardiac Arrest! is almost as fun to use as it is educational. There are varying degrees of difficulty, with over 45 patients — and none is ever the same twice. You can actually go "beyond ACLS" with hypothermia, hypocalcemia, hyperkalemia, and more. Yet the manual is so complete and well-organized that non-medical people use the simulator to "play doctor."

Our other medical teaching software is excellent, and priced within reach of those who need to use it.

ACLS Teaching Series*	$109
Cardiac Arrest!	$69
ACLS Protocols	$29
EKG Teaching	$29
CardioQuiz	$19
Blood Gases	$24

*The four-disk ACLS Teaching Series includes Cardiac Arrest!, ACLS Protocols, EKG Teaching, and CardioQuiz at 34% savings.

Mad Scientist Software
2063 North 820 West, Pleasant Grove, UT 84062
Visa/MC orders call 801-785-3028

RAM CHARGE!

How to Expand Your PC's Memory

Tom Campbell

There's a simple equation in the PC world: RAM = Power. *But with four kinds of memory available for three classes of machines, increasing your PC's RAM can be confusing. To help you get the most power from your next memory upgrade, our resident expert clears away the confusion and charts a straight and easy-to-follow path down memory lane.*

Have any of these things happened to you lately?

▶ You just bought DOS 4.0 and discovered it needs even *more* memory than your previous DOS version. Each MS-DOS upgrade costs more than the $130 or so for the software—more of your precious system RAM is consumed.

▶ You've bought a CAD program. CAD programs generally sport innocent-looking numbers in their system requirements, but look out: Embark on a big project and you'll discover that performance drops by a factor of 20 to 30 percent as the application swaps to disk. Even worse, you may be treated to an OUT OF MEMORY message every time you edit or call up another view.

▶ You want to install OS/2 or Windows. Windows and OS/2 are both multitasking, meaning they can run more than one application simultaneously. Performance drops considerably when those applications are unable to stay in RAM. And by the way, most OS/2 applications require *four megabytes* of RAM right out of the blocks.

▶ You've found another *indispensable* memory-resident program. You want to use *SideKick Plus*, a disk cache, and a printer-enhancement program—except that they have to remain resident along with other programs, and your spreadsheet already needs a full 640K.

More RAM

If any of these situations sounds familiar, you're probably on the lookout for more RAM. With so many options, however, it's no simple task to add more memory. Do you need EMS or EEMS? Do you want 120- or 150-nanosecond RAM? Extended or expanded memory? One wait state or two? Let's sort out the issues.

The first thing to understand about memory is the way it's organized on the PC. The original PC and XT were based on the 8088 chip, which can only *address* one megabyte—or something over one million bytes—of memory. To address one megabyte simply means that the 8088 is physically able to see only a megabyte of memory.

Because the 8088 is a descendant of the 8080, a chip that could address only 64K, Intel implemented a complex scheme called *segmentation* to retain some sort of compatibility with the 8080. The reasons segmentation evolved are beyond the scope of this article, but its use explains why the 64K lim-

itation crops up everywhere: It's the maximum size of a .COM file, the largest file many word processors can manage, the largest array many compilers can handle, the maximum size of an object on the Windows clipboard, and so on.

Keeping It All Straight—A Glossary of Memory Terms

Address. The amount of RAM a CPU can "see." The 8088 can address only one megabyte; the 286 and 386, much more.

EEMS. A short-lived extension to the first popular version of EMS; the EEMS standard was subsumed into LIM spec version 4.

Expanded memory. RAM used to burst the PC-DOS 640K barrier. Designed for 8088/8086 machines, it can also be used by 286 and 386 machines running DOS. Also called EMS or LIM spec memory.

Extended memory. RAM usable only on 286 or 386 machines running in protected mode, such as those running OS/2. Few applications use protected mode currently.

LIM. *See* Expanded memory.

Segmentation. The trick the 8088 uses to address a megabyte of code. The practical effect of segmentation is that it's difficult for software to deal with data in chunks larger than 64K.

Wait state. The time a CPU pauses waiting to fetch another byte from memory. Zero-wait-state machines mean the CPU never has to wait. All EGA cards force many wait states in video memory, so graphics are never as fast as they could be.

Memory Lane

When working with Microsoft to develop PC-DOS, the IBM engineers made some interesting decisions regarding memory usage. They set aside a large number of fixed locations in memory for BASIC, the ROM BIOS, another ROM chip (for which no popular use has yet evolved), and video memory. And even though many operating systems had been devised to manage memory effectively by 1981, IBM took a shortcut by freezing those locations. Suddenly the potential address space for DOS was whittled down to 640K—an unthinkably large amount of memory at the time.

While this decision would come back to haunt IBM later, it did mean that high-performance video software was easier to write. (Windows, at least in theory, doesn't have the luxury of assuming the screen will be in any particular location, so it always has to do extra calculations while the program is running. This is one of the reasons Windows applications seem slower than other graphics programs.)

In 1984, Intel and IBM introduced the 80286 chip and the AT. The 286 did everything the 8088 did, and did it much faster—at least in what is commonly referred to as *real mode*, a designation coined by Intel that means the 286 emulates the 8088 (well—actually, the 8086, a fraternal twin to the 8088, but it's a razor-thin distinction that need not be made here).

Kick the 286 into *protected mode* and you have a stunning 16-megabyte RAM capacity, virtual memory (the ability to use your hard disk as if it were RAM), and multitasking (the ability to run several programs at once).

There was a small problem with the 286 whose implications were not commonly understood for another year or two after the AT's introduction: There was no way to make practical use of its new features without a full rewrite of DOS and the memory-management routines used by most commercial applications. Consequently, much of the promise of the AT went unfulfilled until the advent of OS/2.

It turned out that even switching between protected and real mode was impractical in most cases and fatal when some communications software was being run. Two uses of the memory beyond the megabyte mark that did achieve fairly widespread popularity were ramdisks and disk caches—not quite the revolutionary use of protected mode that was hoped for.

Meet the Screamer

The 80386 added yet another twist. It offered both modes the 286 offered and raised the ante by one: a third mode called *virtual 8086*. Virtual 8086 mode is what the 286 *should* have offered: the ability to emulate the 8086 as if in real mode, but simulating numerous 8086s simultaneously. This gives the 386 the ability to do true multitasking of existing DOS software. A fourth mode, 286 emulation, is rarely used.

Two less obvious disadvantages to the new chips were that memory boards required new circuitry to handle the memory in protected mode and faster (read *more expensive*) memory chips were needed to squeeze full power out of the muscular 286s and 386s. By 1986, power users in the 8088-based world, which accounts for some 7 million or so computers today, were struggling with the 640K DOS limitation.

Expanding Memory

There are several ways to use additional memory on an 8088, but they all involve specialized hardware for memory management

because the 8088 is physically unable to make use of addresses beyond one megabyte.

The technique is fairly simple: Copy a section of memory into the out-of-bounds area filled by extra RAM. Copy a section from the out-of-bounds region into the DOS workspace. When that memory is no longer needed, swap them again. This technique is called *paging*. The trick is getting hardware and software manufacturers to agree on a way to do it; otherwise everyone will implement the technique differently, each one hoping for market dominance.

A few years ago, hardware and software makers alike banded together in a remarkable display of unity. After a false start, they settled on a combined hardware-and-software specification for *expanding* the amount of memory that DOS could use beyond 640K—up to 32 megabytes beyond it. This meant that while software developers still had to write special routines to make use of the memory, at least those routines would work with any memory board. It also meant that no hardware manufacturer could monopolize the expanded-memory-board market solely through technology.

Lotus, Intel, and Microsoft were among the early adopters of this specification, so it was dubbed the *LIM spec*, although it's often referred to simply as expanded memory. AST and Quarterdeck weren't satisfied with LIM, so they created a second standard that was compatible with LIM but did more.

The AST/Quarterdeck effort went by the confusing moniker *EEMS*, for Extended Enhanced Memory Specification. Instead of using 16K chunks for paging, it could use 64K pages. EEMS also allowed programs to run in expanded memory. But in the final analysis, it was just another hard choice for developers.

New LIM

The potentially alarming double standard in memory specifications was resolved neatly in August 1987 with what is now the most popular version, LIM spec version 4, or simply LIM 4. Version 4 does everything AST's and Quarterdeck's EEMS could do and files down a few of the sharp edges. EEMS users were supplied with new drivers that ran the new spec, and everyone was happy.

LIM memory is used mostly for ramdisks, disk caches, data (such as display information for a graphics program or spreadsheet data), and suspended programs. It's the only widely accepted means of going beyond 640K in DOS applications, and most major software developers support it. Examples include Borland's *Turbo* languages, Lotus's *1-2-3* and *Symphony*, and Ashton-Tate's *Framework*. Even DOS 4.0 offers system calls to use LIM memory, so it's here to stay.

There's a price for the new ability, though. LIM exacts a severe speed penalty compared to regular system memory, so much so that a fast hard disk and disk cache program can beat LIM in some cases.

Extending Memory

Machines based on the 286 and 386 are a different story. These chips were built from the ground up to address, in protected mode, at least 16 megabytes. This memory is called, confusingly enough, *extended* memory. It requires special circuitry and only works in ATs and 386 machines. Most extended memory boards now offer expanded memory drivers.

Since few applications can run in protected mode—XENIX, CAD, and artificial intelligence programs being notable exceptions—protected mode still goes largely un-

Memory Side Issues

Video Memory

If you purchased an EGA or compatible several years ago, you may have had to buy it with less than 256K—its fully populated state and the way most EGAs are sold today. Many pioneers bought EGAs with only 64K and were unable to see all 64 colors at full resolution.

If you have a 64K EGA, you may want to buy a daughterboard to bring the card to its full potential. Another interesting issue is that video memory is incredibly slow compared to system RAM. Most EGA boards insert dozens of wait states, which is why Compaq's ultrafast EGA and VGA boards are a real hit in the graphics community.

It's also less well known that ROM is slower than RAM, so some machines copy the EGA ROM BIOS into speedy system RAM to keep the last few cycles busy.

LIMulators

The popularity of LIM drivers has led to a curious breed of utility program: the LIM emulator. These programs use the disk as if it were LIM memory, giving you the capabilities of LIM without the expense of hardware.

A LIM emulator is usually slower than real LIM, especially if small amounts of memory are paged in and out of LIM space repeatedly. Nonetheless, it's a perfectly workable alternative if you simply can't afford a memory upgrade but need LIM for a spreadsheet or two.

Some hard disks are so fast that with a good caching scheme, a LIM emulator is quite acceptable.

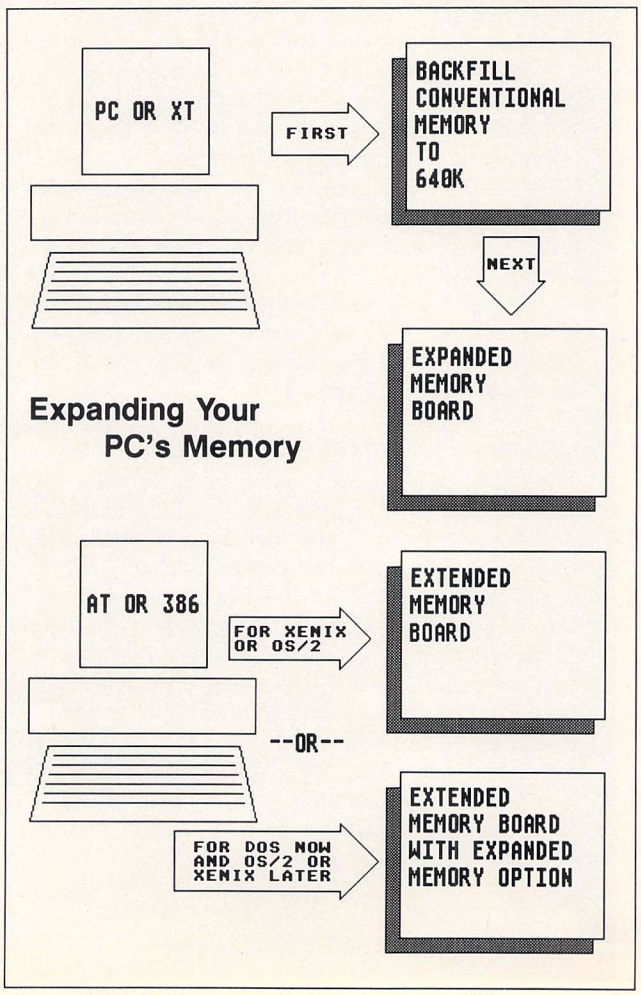
used. That will change as OS/2 matures, since OS/2 uses the protected mode *only*. Because most 286 and 386 machines are running PC-DOS, they're in the odd position of having to use the far less efficient method of using expanded memory in real (pure 8088-emulation) mode.

Most PC compatibles have an 8-bit bus. That means data moves in and out of the CPU 8 bits at a time. AT compatibles use 16-bit buses, so they move memory twice as efficiently (ideally). Those with 386 machines can move memory 32 bits at a time, but because there's no IBM standard for PC AT–compatible 32-bit buses, every manufacturer does 32-bit memory differently on 386 machines.

In general, then, try to get 16-bit memory for your AT, and if your funds allow it and speed is critical, get the manufacturer's 32-bit memory for a 386 machine. You can use 8-bit memory in an AT and 16-bit memory in a 386, but each way cripples the machine's throughput.

Chip Speed

RAM runs at different speeds, just like CPUs. If you have a classic 4.77-MHz PC or XT, any memory is fine. If you have an AT or better, you need to think about *wait states*.



At AT speeds, the CPU can sometimes shuffle bytes around faster than the RAM circuitry can, so it has to slow itself down and wait until the RAM catches up. Without getting bogged down in details, suffice it to say that the fewer the wait states, the better. The ideal system has zero wait states.

When you buy memory, check your system's operations manual, and it will tell you what speed the RAM is and how many wait states are inserted. RAM speed is measured in nanoseconds, or billionths of a second, so a system with 120-ns chips can go out and fetch a byte in 120 billionths of a second. You can't install slower chips on your system without taking a performance hit, because all RAM runs only as fast as the slowest chip. For example, don't buy 150-ns chips for your 12-MHz, zero-wait-state AT clone if it uses 100-ns chips.

Kilobits and Kilobytes

When you buy chips, you'll usually see them listed as 64K or 256K. That's kilo*bits*, not kilo*bytes*. Eight 64K chips are required for a 64-kilobyte upgrade, and eight 256K chips are needed for a 256-kilobyte upgrade. If your system uses parity checking, add one chip to each set for a total of nine chips. Most boards accept either 64K or 256K. Your best bet is to buy 256K chips. Not only do they conserve valuable real estate and normally cost much less per kilobyte, they also have a much more important advantage: fewer parts to overheat or go bad.

Newer boards now accept one-megabit chips. Go with them if you can afford to do so, again for reasons of stability.

Buyer's Bottom Line

Here, in a nutshell, is what to look for when you're buying RAM.

▶ If you have an 8086 or 8088 machine, first add memory to the 640K limit (this is called *backfilling*). If you want more memory, buy expanded memory.

▶ If you buy expanded memory, make sure it's LIM version 4.0 or later, and make sure the memory board is fully compatible with the 4.0 spec—even now, some hardware manufacturers aren't providing fully functional drivers.

▶ If you have an 80286 or 80386 machine, your best bet is to buy an extended memory board for future compatibility and make sure it has an expanded memory driver for current compatibility. Try also to get memory on a 16-bit or 32-bit bus if you have an AT or 386.

▶ Make sure you buy chips rated no slower than those already in your machine. If you haven't purchased a computer yet, get one with zero- or one-wait-state memory. **PC**

Buyer's Guide to Expanded Memory Boards

CAROLINE HANLON

Board	Manufacturer	EMS 3.2	EMS 4.0	EEMS	Memory	Extended	Conventional	PC	XT	AT	PS/2 Models	Other	Serial Port	Parallel Port	Software	Warranty	Price with 0K	Price with 512K	Populated Price	Comments
AT M-32 Byte Memory Board	ACER Technologies	●	○	○	0K–2MB	○	○	○	○	●	○	○	○	○		1 yr	$729			
Mem16	Advanced Microcomputer Systems	○	●	○	8MB	●	○	○	○	○	50, 60, 70	○	○	○	Driver	2 yr	$125		Call for price	
Rampage 286	AST	○	●	○	2MB	●	●	○	●	●	○	○	○	○	SuperDrive, SuperSpool, ramdisk	2 yr	$405			
RampagePlus/286	AST	●	●	●	8MB	●	○	○	○	●	○	○	opt	opt	SuperDrive, fASTdisk, SuperSpool print spooler	2 yr	$595	$895		
Rampage/2	AST	○	●	○	2MB	○	●	●	●	○	30	○	○	○	Ramdisk, print spooler	2 yr			256K $495; 1MB $1,245	
RampagePlus/MC	AST	●	●	●	8MB	●	○	○	○	○	50, 60	○	opt	opt	SuperDrive, fASTdisk, SuperSpool	2 yr	$595	$895		Supports Micro Channel Architecture
1083	ATD	○	●	○	2MB	○	○	○	●	●	○	○	○	○	Ramdisk, print spooler	2 yr	$99			
BOCARAM.MCA 50Z	Boca	○	●	○	2MB	●	○	○	○	○	50, 50Z, 60	○	○	○	Ramdisk, print spooler, memory driver, diagnostics	2 yr	$245		2MB $995	Includes Micro Channel support and built-in translation RAM (TRAM)
BOCARAM30	Boca	○	●	○	2MB	○	○	○	○	○	25, 30	○	○	○	Print spooler, ramdisk, diagnostics	2 yr	$175		2MB $1,145	Software installation
BOCARAMAT	Boca	○	●	○	2MB	●	●	○	○	●	○	○	○	○	Ramdisk, print spooler, diagnostics	2 yr	$225	$445	2MB $1,195	Allows up to 128K conventional memory and 4MB extended memory
BOCARAMAT Plus	Boca	○	●	○	8MB	●	●	○	○	●	○	○	○	○	Ramdisk, print spooler, diagnostics	2 yr	$225		2MB $995	Software installation
BOCARAMXT	Boca	○	●	○	2MB	○	○	●	●	●	○	○	○	○	Print spooler, ramdisk, diagnostics	2 yr	$175		2MB $1,145	Software installation

Lyco Computer

Marketing & Consultants

Since 1981

Air orders processed within 24 hours.

HEADSTART by Vendex

$969.95

Color System

- Ready to plug in and use immediately
- Ultra fast 8 Mhz Intel 8088-2 Processor
- 512K RAM memory expandable to 768K
- 2-360K disk drives standard
- First complete system with clock calendar and built-in ports for printer, RS232 2 joysticks, mouse and light pen
- Includes $500 worth FREE software programs
- Hi Res color monitor included!

LASER Turbo XT Model II

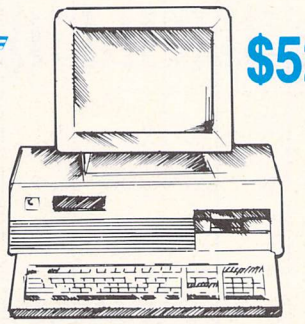
- Dual Speed 4.77-8 Mhz
- 640K Std.
- Built-in ColorCard
- 8 Expansion Slots
- Built-in Floppy Drive
- Can Expand to 2 Floppy & 2 Hard Drives
- Green, Amber & Color Monitors Available

$629.95

8088 XT

- Monitor Optional
- 16 Bit 8088 Intel Running at 4.77/10 MHz
- 640K RAM
- One 360K Floppy, 1 Parallel Port
- Multi I/O (includes 1 Serial Port, 1 Game Port, Clock Calendar, Disk Controller for Two 360K's)
- (8) Eight Expansion I/O Slots
- Jr. AT Case w/Keylock Turbo, Reset LED

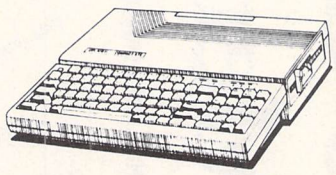
$529.95



LASER Compact XTE

- 640K RAM
- built-in EMS board for memory expansion to 166 4K
- built-in EGA board

$549.95

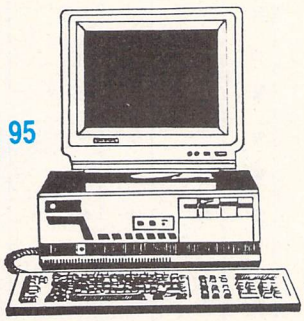


CITIZEN Mate/12

- Keyboard switchable 12.5/6.25 MHz
- 1 M byte memory standard
- 2 serial, 1 parallel and 1 mouse port
- Floppy and hard drive controllers
- MS DOS 3.3, GW Basic and set-up/Diagnostics
- EGA

$1349.95

**Monitor Optional*



286 AT

**Monitor Optional*

- 16 Bit 80286 Intel Running at 8/12 MHz
- 640K High Speed RAM (Expandable to 4MB)
- One 5.25" 1.2MB Floppy Drive
- 8 I/O Slots (6/16 Bit and 2/8 Bit)
- 200 Watt Power Supply
- 101 Key Enhanced Keyboard
- High Speed Dual FD/HD Controller

$999.95

Seagate HARD DRIVES

5.25" Half Heights

ST225 20 meg 65msec MFM	$219.95
ST225N 20 meg SCSI	$289.95
ST238R 30 meg RLL	$229.95
ST251 40 meg 40 msec MFM	$339.95
ST251-1 40 meg 28 msec MFM	$419.95
ST277R 65 meg 40 msec RLL	$379.95

Seagate Internal Cards

ST125 20 meg Internal Card	$299.95
ST157R 49 meg Internal Card	$485.95

3.5"

ST125 20 meg 40 msec MFM	$235.95
ST125N 20 meg SCSI	$299.95
ST138R 30 meg RLL	$249.95
ST138N 30 meg SCSI	$329.95
ST157R 49 meg RLL	$399.95
ST157N 48 meg SCSI	$439.95

Controllers

MFM Controller (XT)	$55.95
RLL Controller (XT)	$64.95

PC COMPATIBLE HARDWARE

Laser Compact XTE 640	$549.95
Laser Turbo XT II	$629.95
Blue Chip Popular	$CALL
Vendex Headstart Color	$969.95
Vendex Headstart Mono	$CALL
Vendex Headstart 888 LTD	$CALL
Sharp PC-4502	$1,169.95
Sharp PC-4521	$1,949.95
Amstrad PPC 640	$779.95
Amstrad PC 1640	$839.95
Mitsubishi 310/AT	$1,229.95
BCC CG Color Card	$94.99
ATI VIP	$299.95
Kraft PC Joystick Card	$24.95

1-800-233-8760

Lyco Means Total Service.

TO ORDER, CALL TOLL-FREE: 1-800-233-8760
New PA Wats: 1-800-233-8760
Outside Continental US Call: **1-717-494-1030**

Hours: Monday through Friday, 9:00 a.m. to 9:00 p.m.
Saturday, 10:00 a.m. to 6:00 p.m.

For Customer Service, call **1-717-494-1670**
9:00 a.m. to 5:00 p.m., Monday through Friday
Or write: Lyco Computer, Inc.
P.O. Box 5088, Jersey Shore, PA 17740

MasterCard VISA

Mark "Mac" Bowser, Sales Manager

I would personally like to thank all of our past customers for helping to make Lyco Computer one of the largest mail order companies and a leader in the industry. Also, I would like to extend my personal invitation to all computer enthusiasts who have not experienced the services that we provide. Please call our trained sales staff at our toll-free number to inquire about our diverse product line and weekly specials.

First and foremost our philosophy is to keep abreast of the changing market so that we can provide you with not only factory-fresh merchandise but also the newest models offered by the manufacturers at the absolute best possible prices. We offer the widest selection of computer hardware, software and accessories.

Feel free to call Lyco, if you want to know more about a particular item. I can't stress enough that our toll-free number is not just for orders. Many companies have a toll-free number for ordering, but if you just want to ask a question about a product, you have to make a toll call. Not at Lyco. Our trained sales staff is knowledgeable about all the products we stock and is happy to answer any questions you may have. We will do our best to make sure that the product you select will fit your application. We also have Saturday hours — one more reason to call us for all your computer needs.

Once you've placed your order with Lyco, we don't forget about you. Our friendly, professional customer service representatives will find answers to your questions about the status of an order, warranties, product availability, or prices.

Lyco Computer stocks a multimillion dollar inventory of factory-fresh merchandise. Chances are we have exactly what you want right in our warehouse. And that means you'll get it fast. In fact, orders are normally shipped within 24 hours. Free shipping on prepaid orders over $50, and there is no deposit required on C.O.D. orders. Air freight or UPS Blue/Red Label shipping is available, too. And all products carry the full manufacturer's warranties.

I can't see why anyone would shop anywhere else. Selection from our huge inventory, best price, service that can't be beat — we've got it all here at Lyco Computer.

PLEASE NOTE: ● full manufacturers' warranties ● no sales tax outside PA ● prices show 4% cash discount; add 4% for credit cards ● APO, FPO, international; add $5 plus 3% for priority ● 4-week clearance on non-certified checks ● we check for credit card theft ● sorry, compatibility not guaranteed ● return authorization required ● due to new product guarantee, return restrictions apply ● price/availability subject to change ● prepaid orders under $50 in Continental US, add $3.00.

PRINTERS

STAR

NX-1000	$169.95*
NX-1000 Color	$225.95
NX-15	$289.95
NR-10	$319.95
NR-15	$419.95
NB-15 24 Pin	$669.95
NX-2400	$309.95
NB24-10 24 Pin	$369.95
NB24-15 24 Pin	$545.95
Laser 8	$1759.95

Epson

LX800	$184.95
FX850	$339.95
FX1050	$499.95
EX800	$434.95
LQ500	$339.95

Seikosha

SL 80Ai	$329.95
MP5420FA	$999.95
SP Series Ribbon	$7.95
SK3000 Ai	$349.95
SK3005 Ai	$445.95
SPB 10	$CALL
SL 130Ai	$599.95
SP 1600Ai	$CALL

Brother

M1109	$189.95
M1509	$335.95
M1709	$439.95
Twinwriter 6 Dot & Daisy	$899.95
M1724L	$569.95
HR20	$345.95

Panasonic

1080i Model II	$159.95
1091i Model II	$179.95
1180	$179.95
1190	$CALL
KXP 4450 Laser	$1599.95
1524 24 Pin	$559.95
Fax Partner	$579.95
Optical Scanner	$859.95
1124	$319.95

*quantities limited

Toshiba

321SL	$489.95
341 SL	$659.95
351 SX 400 cps	$979.95

Okidata

180	$219.95
182	$209.95
182+	$225.95
183	$239.95
292 w/interface	$449.95
293 w/interface	$585.95
294 w/interface	$799.95
393	$955.95
Laser 6	$CALL
390	$479.95
391	$649.95
320	$345.95
321	$475.95

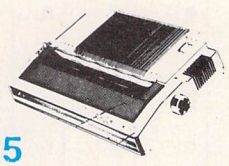
Interfacing available

Citizen

120D	$149.95
180D	$159.95
MSP-40	$279.95
MSP-15E	$329.95
MSP-50	$369.95
MSP-45	$389.95
MSP-55	$459.95
Premiere 35	$499.95
Tribute 224	$589.95
Tribute 124	$399.95

star micronics NX-2400

- 170 cps LQ
- 57 cps LQ
- 24 pin

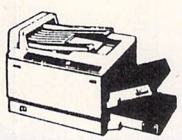


$309.95

Panasonic KXP4450 Laser Partner

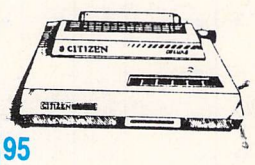
$1599.95

- Incredible 11 Pages per Minute
- 2 Lettersize Cassettes Std.
- 300 dpi Resolution
- 5 Printer Emulation Modes
- 512K RAM Std.
- 5000 Page per Month



CITIZEN MSP-40

- 200 CPS Draft
- 40 CPS NLQ
- Graphics



$279.95

Monitors

NEC

Multisync GS	$189.95
Multisync II	$589.95
Multisync +	$899.95
Multisync XL	$2099.95

Magnavox:

BM7652	$79.95
BM7622	$79.95
7BM-613	$79.95
9CM-053	$339.95
CM8762	$239.95
8CM-515	$CALL
9CM-082	$439.95

Modems

Hayes:

Smartmodem 300	$139.95
Smartmodem 1200	$279.95
Smartmodem 2400	$419.95
Smartmodem 1200B (w/software)	$279.95
Smartmodem 2400B (w/software)	$419.95

Avatex:

1200e	$65.95
1200i PC Card	$65.95
1200p	$89.95
1200hc Modem	$89.95
2400	$149.95
2400i PC Card	$139.95

Joysticks

Tac 1 & IBM/AP	$26.95
Wico IBM/AP	$29.95
Lipstick Plus	$14.95
Kraft KC III AP/PC	$16.95
Kraft PC Joystick Card	$27.95
Kraft Maze Master	$8.95

Board	Manufacturer	EMS 3.2	EMS 4.0	EEMS	Memory	Extended	Conventional	PC	XT	AT	PS/2 Models	Other	Serial Port	Parallel Port	Software	Warranty	Price with 0K	Price with 512K	Populated Price	Comments
CI-Sys 2-56	Chrislin Industries	○	●	○	2–8MB	●	●	○	○	○	●	○	opt	opt		5 yr			2MB $1,480; 4MB $2,930; 6MB $3,655; 8MB $4,380	Daughterboard capabilities
Mem-AT+	Computer Elektronik	●	○	○	3MB	●	●	○	○	●	○	○	○	○	Print spooler, driver	2 yr	$489			
MicroFour	Computer Elektronik	●	○	○	4MB	●	○	○	○	○	●	○	○	○	Driver	2 yr	$399			
Multi-3AT	Computer Elektronik	●	○	○	2MB	●	●	○	○	●	○	○	●	●	Print spooler, driver	2 yr	$599			
Multi-4AT	Computer Elektronik	●	○	○	4MB	●	○	○	○	●	○	○	●	●		2 yr	$895			Includes EGA
RAMFlex	Computer Elektronik	●	●	●	8MB	●	●	○	○	●	○	○	○	○	Driver	2 yr	$595		$469 for 0K short version	
Super MicroFour	Computer Elektronik	●	●	●	4MB	●	○	○	○	○	●	○	○	○	Driver	2 yr	$595			
XRAM	Computer Elektronik	●	●	●	1–2MB	○	○	○	○	○	30	○	○	○		2 yr			1MB $999; 2MB $1,359	Replaces Riser card in machine with memory/Riser card combination
CPI-XMA	Computer Peripherals	○	●	○	2–4MB	●	●	●	●	●	30	○	○	●	Memory-test program	2 yr			2MB $2,495; 4MB $3,995	
PS/M8	Computer Peripherals	○	●	○	8MB	○	○	○	○	○	50, 60, 80	○	○	○		2 yr	$499			
PC/M8	Computer Peripherals	●	○	○	8MB	○	○	○	○	○	50, 60, 80	○	○	○		2 yr	$499			
Diamond Plus	DFI	○	●	○	2MB	○	○	○	●	○	○	○	●	●	Ramdisk, print spooler, diagnostics	2 yr	$149			Includes game port, clock, calendar
MegaBit	DFI	○	●	○	2MB	●	○	○	○	●	○	○	○	○		2 yr	$139			
MEMO-2000A	DFI	○	●	○	2MB	●	○	○	○	●	30, 286	○	○	○	Ramdisk, print spooler, diagnostics	2 yr	$139			
MEMO-2000X	DFI	○	●	○	2MB	●	○	○	●	○	25, 30	○	○	○	Ramdisk, print spooler, diagnostics	2 yr	$129			
MF-3000	DFI	●	○	○	1.5MB	●	○	○	○	●	30	○	●	●		2 yr	$139			Optional daughterboard adds 1.5MB; supports EMS 3.2 with optional software
RAMBank-II	DFI	●	○	○	4MB	●	○	○	○	○	●	○	○	○		2 yr	$189			Supports OS/2, Micro Channel
Everex RAM 10000	Everex	○	●	○	10MB	●	○	○	○	●	○	○	○	○	Memory manager, ramdisk, print spooler	1 yr	$399			
Everex RAM 3000 Deluxe	Everex	○	●	○	3MB	●	○	○	○	●	○	○	○	○	Memory manager, ramdisk, print spooler	1 yr	$228			Software installation

Everex RAM 8000	Everex	○	●	○	8MB	●	○	○	○	●	○	○	○	○	Memory manager, ramdisk, print spooler	1 yr			Call for price
RAM II 2000	Everex	○	●	○	2MB	●	○	○	○	○	50, 60	○	○	○	Memory manager, ramdisk, print spooler	1 yr	$399		
RAM II 4000	Everex	○	●	○	4MB	●	○	○	○	○	50, 60	○	○	○	Memory manager, ramdisk, print spooler	1 yr	$499		
AT Aboveboard	Fivestar Electronics	○	●	○	0K–3MB	○	○	○	○	●	○	○	○	○		1 yr	$149		
XT Aboveboard	Fivestar Electronics	○	●	○	2MB	○	○	○	●	○	○	○	○	○		1 yr	$99		
ATMEM300-SP	ICS Computer Products	●	○	○	3MB	●	●	○	○	●	○	○	opt	opt		1 yr	$249		Hardware and software installation
IDEAmax 30	IDEAssociates	●	●	○	8MB	○	○	○	○	○	30	○	○	○	Ramdisk, print spooler, swap utility	1 yr	$275		
IDEAmax/MC	IDEAssociates	●	○	○	12MB	●	○	○	○	○	50, 60	○	2	1	Ramdisk, print spooler, swap utility	1 yr	$395		
Supermax 30	IDEAssociates	●	●	○	8MB	○	○	○	○	○	30	○	2	1	Ramdisk, print spooler, swap utility	1 yr	$395		
Supermax/EMS	IDEAssociates	●	○	○	16MB	●	○	○	286	●	30, 286	○	2	1	Ramdisk, print spooler, swap utility	1 yr	$425		
Supermax/MC	IDEAssociates	●	○	○	8MB	●	○	○	○	○	50, 60	○	2	○	Ramdisk, print spooler, swap utility	1 yr	$545		
IDEAmax 80	IDEAssociates	○	●	○	8MB	●	○	○	○	○	70, 80	○	○	○	Ramdisk, print spooler, swap utility	1 yr	$495		
Above Board 286	Intel	○	●	○	512K–2MB	●	●	●	○	●	30	386 systems	○	○	Ramdisk, print spooler	5 yr		$645	Upgrade available
Above Board Plus	Intel	○	●	○	8MB	●	●	○	○	●	30	386 systems	●	●	Ramdisk, print spooler	5 yr	$495	$795	Offers concurrent multitasking; replaces Above Board 286
Above Board Plus I/O	Intel	○	●	○	8MB	●	●	○	○	●	30	386 systems	●	●	Ramdisk, print spooler	5 yr		$945	Offers concurrent multitasking
Above Board PS/286	Intel	○	●	○	512K–2MB	●	●	●	○	●	30	386 systems	●	●	Ramdisk, print spooler	5 yr		$695	
PCEMS Board	Legacy Technologies, Ltd.	●	○	○	3MB	●	●	●	●	○	○	○	○	○	Driver	1 yr	$149		Also supplies memory expansion for PCjr
Ready RAM	Longshine	○	●	●	2MB	○	●	○	●	●	○	○	○	○	Print spooler, ramdisk, utilities	1 yr	AT $95 XT $87		
MGB235 EMS Aboveboard	Magitronic Technology	○	○	●	2MB	○	○	●	●	○	○	○	○	○	Driver program	1 yr	$99		
EasyTalk EMS	Megahertz	●	○	○	1MB	●	○	○	○	○	○	Toshiba laptops	○	○	EMS ramdisk, communications software	2 yr		$999	Board combines 300/1200 baud modem with memory expansion

Board	Manufacturer	EMS 3.2	EMS 4.0	EEMS	Memory	Extended	Conventional	PC	XT	AT	PS/2 Models	Other	Serial Port	Parallel Port	Software	Warranty	Price with 0K	Price with 512K	Populated Price	Comments
EMS 5150T	Micro Mainframe	●	○	○	2MB	○	○	○	●	○	○	Tandy 1000 series	○	○	Ramdisk, print spooler	1 yr	$200			Includes connector to add second daughterboard; uses standard 256K chips
MB-18-DH	Micron Technology	○	●	○	1–2MB	●	○	○	○	●	○	○	○	○	Ramdisk, print spooler, RAM diagnostics	2 yr			$875	
MB-28-DH	Micron Technology	○	●	○	2–4MB	●	○	○	○	●	○	○	○	○	Ramdisk, print spooler, RAM diagnostics	2 yr			$1,395	
MB-48-DH	Micron Technology	○	●	○	4MB	●	○	○	○	●	○	○	○	○	Ramdisk, print spooler, RAM diagnostics	2 yr			$2,495	
JustRAM/AT16	Monolithic Systems	○	●	○	512K–16MB	●	●	○	○	●	○	○	○	○	Memory manager, ramdisk, disk caching, print spooler, diagnostics	5 yr			2MB $2,068	
JustRAM/ATZ	Monolithic Systems	○	●	○	2–8MB	●	●	○	○	●	○	○	○	○	Print spooler, ramdisk, disk cache	5 yr			2MB $1,721	
Concentration	Newer Technology	○	●	○	32MB	●	●	○	●	●	○	○	○	○			$770	$950		
LIMfile	Newer Technology	○	●	○	8MB	○	●	○	●	●	○	○	○	○	Ramdisk		$790		2MB $2,160	Optional daughterboard adds 8MB
16 Megger	PC Tech	●	○	○	2–16MB	●	○	○	●	●	○	○	○	○		90 days	$395		16MB $6,495	16-bit transfer for expanded and extended memory
4 Megger	PC Tech	●	○	○	256K–4MB	○	○	●	●	●	○	○	○	○		90 days			256K $198	Works in 8- or 16-bit bus
286 RAMRacer	PC Technologies	●	●	●	1.5MB	○	●	●	●	○	○	○	○	○	Driver	2 yr	$445			
SUPERAM	Piiceon	○	○	○	4MB	○	○	○	○	○	○	Compaq 386 models	○	○		1 yr			4MB $3,199	
Liberty-PC	Quadram	○	●	○	2MB	○	●	●	○	○	○	○	○	○	Ramdisk, print spooler, PolyWindows Desk Plus desktop-management software	2 yr	$300			5-year limited warranty on 2MB board
Quadboard PS/Q	Quadram	○	●	○	4MB	●	○	○	○	○	50, 60	○	●	●	Memory driver	1 yr	$595	$745		Switch-selectable Micro Channel ID
Quadboard-AT	Quadram	●	●	○	3.5MB	○	○	○	○	●	○	○	●	●		1 yr	$500		128K $540	Compatible with Liberty-AT
QuadEMS+ I/O	Quadram	●	○	●	1MB	○	●	●	●	○	○	○	●	●		1 yr		$655	256K $545	Software installation; daughterboard option adds 1MB; battery-backed clock

QuadMEG PS/Q	Quadram	○	●	○	4MB	●	○	○	○	○	50, 60	○	○	○	Ramdisk, print spooler, memory driver	1 yr	$395	$545	
Quiksand Memory Expansion Board	Star Gate Technologies	●	○	○	0K–2MB	●	○	○	○	●	○	○	○	○		1 yr	$299		Price for 12.5 MHz; $226 for 8–10 MHz board
Memory Companion/PC	STB Systems	○	●	○	2MB	○	○	●	●	●	25, 30	○	○	○	PC Accelerator utility	2 yr	$200		
RapidRAM 2	STB Systems	○	●	○	2MB	●	●	○	○	○	50, 60	○	○	○	RapidMAP memory manager	2 yr	$399	2MB $1,395	
RapidRAM 2/8	STB Systems	○	●	○	8MB	●	●	○	○	○	50, 80	○	○	○	RapidMAP memory manager	2 yr		2MB $1,495; 8MB $5,195	
Memoplus-A.4	Suntek Information	○	●	○	2MB	●	●	○	○	●	30, 25	○	○	○	RMS memory management, ramdisk, print spooler	1 yr	$135		
Memoplus-X.4	Suntek Information	○	●	○	2MB	○	●	○	●	○	○	○	○	○	RMS memory management, ramdisk, print spooler	1 yr	$125		
JRAM AT2	Tall Tree Systems	○	●	○	2MB	●	○	○	○	●	○	○	○	○	Ramdisk, print spooler	1 yr	$349		Uses 256K chips; optional laser printer and scanner port
JRAM AT4	Tall Tree Systems	○	●	○	8MB	●	○	○	○	●	○	○	○	○	Ramdisk, print spooler	1 yr	$399		Optional port for laser printer and scanner
JRAM3	Tall Tree Systems	○	●	○	2MB	○	●	○	●	○	○	○	○	○	Ramdisk, print spooler	1 yr	$269		Option to add laser port or serial and parallel ports
Captain 286	Tecmar	○	●	○	4MB	●	●	○	●	●	○	Compaq 286 and 386	●	●	Utility to switch between expanded and extended memory	2 yr	$575	$795	
MicroRAM	Tecmar	○	●	●	2MB expanded; 8MB extended	●	○	○	○	○	50, 50Z, 60, 70, 80	○	opt	opt		2 yr	$350	$550	
MicroRAM 50/60	Tecmar	○	●	○	2MB	●	○	○	○	○	50, 50Z, 60	○	○	○		2 yr	$350	$550	Uses FEFE address
MicroRAM AD	Tecmar	○	●	○	8MB	●	○	○	○	○	50, 50Z, 60, 70, 80	○	opt	opt		2 yr	$445	$645	
Low Profile Megamem	Veritek	●	○	○	2MB	○	○	○	●	●	○	○	○	○	Driver	2 yr	$161		
1 Megabyte Memory Expansion Module	Wells American	○	●	○	1–4MB	●	●	○	○	●	○	○	●	●	Driver	1 yr		1MB $995	Self-installing

COMPUTER DIRECT

Since 1979 — **WE WON'T BE UNDERSOLD!*** — Prices Expire 3-31-89

Seagate

20 MEG Harddrive

- 20 Mega Byte Storage
- Floppy Disk Controller Included
- Fits IBM PC, XT & Compatibles
- List Price $499

$249.95

Seagate 40 MEG Harddrive

- 38 ms Access
- 40 Mega Byte Storage
- Half Height Construction
- List $699

$339.95

Seagate 80 MEG Harddrive

- 28 ms Average access time
- 80.2 Megabytes per drive
- 5 Discs
- List $799

$599.95

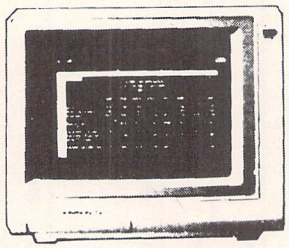
KALOK

3½" 20 MEG Harddrive

- 26 Major Components
- Full ST-412 Interface Compatibility
- Open Loop Stepper Motor
- List $399

$249.95

12" TTL Monochrome Monitor



For IBM & Compatibles

- High Resolution
- 80 Column
- Non-glare Screen
- 1000 Lines at Center
- Super Low Sale Price

Our Low Sale Price

$49.95

List $199

PC, XT & AT Compatible Internal Disk Drives

TEAC 360K - 5¼" Drive

- Double Sided/Double Density
- Fits IBM PC, XT & Compatibles
- Half Height

$79.95

List Price $199

TEAC 1.2 M - 5¼" Drive

- 1.2 Mega Byte Memory
- Fits IBM AT & Compatibles
- Double Sided/Double Density

$99.95

List Price $199

TEAC 720K - 3½" Drive

- Double Sided/Double Density
- Fits IBM PC, XT & Compatibles
- Half Height

$99.95

List Price $199

TEAC 1.44 M - 3½" Drive

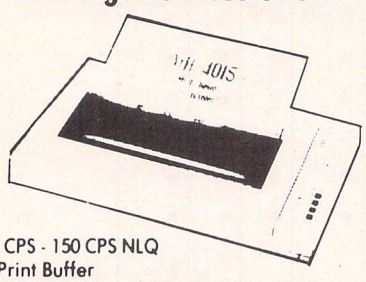
- 1.44 Mega Byte Memory
- Fits IBM AT & Compatibles
- Double Sided/Double Density

$139.95

List Price $299

720 CPS 15" Printer

Multi-Head Wide Carriage Printer With High Dot Resolution



- 720 CPS - 150 CPS NLQ
- 8K Print Buffer
- Print Speed of **214 LPM** In Draft
- 6 Print Heads Achieve High Dot Resolution In Higher Speed
- NLQ Speed Of 47.4 LPM
- 136 Column Wide Carriage
- IBM and Epson Mode
- Parallel Centronics Port

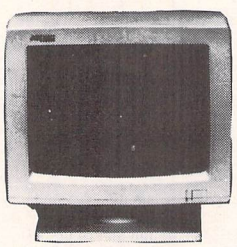
Our Low Sale Price

$699.95

List $1995

IMTEC 14" Multiscan Monitor

IBM CGA, EGA, VGA, and PGA Compatibles



- Tilt and Swivel Base
- 14" non-glare screen
- 256 PGA colors
- 720 Dots Horizontal
- 480 Dots Vertical
- One-year Warranty
- IBM PC XT and AT compatability

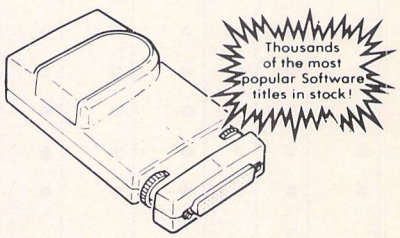
Our Low Sale Price

$399.95

List $599

1200 Baud Migent Pocket Modem

Free Terminal Software



- Hayes compatible
- Runs on AC or battery
- Turns on/off automatically
- Small enough to put in your pocket
- Plugs directly into your serial port on many computers
- Easy to use; no switches to set
- On-screen status lights show call progress

Our Low Sale Price

$89.95

List $413

IMMEDIATE ANSWER

Call **800 - BUY - WISE**

800 - 289 - 9473

Mail

We Love Our Customers!

COMPUTER DIRECT
22292 N. Pepper Rd.
Barrington, IL 60010

BEST SERVICE IN THE USA (Price is Not Enough!)

- Fast, Low Cost Delivery
- 15 Day Home Trial
- Free Technical Assistance
- No Credit Card Fees
- 90 Day Immediate Replacement
- Free Catalogs

MODEM MADNESS SALE

MODEM MADNESS SALE

ALL ARE HAYES COMPATIBLE
ALL SOFTWARE INCLUDED

1200 Baud Internal Modem

- 1200 Baud Bell 212A/103 at 1200/300 BPS
- Automatic Dialing & Answering
- Built-In Speaker with Volume Control
- Separate Voice and Data Jacks
- Both Touch Tone and Pulse Dialing
- Extensive Diagnostics

Our Low Sale Price $59.95 List $149

2400 Baud Internal Modem

- Full or Half-Duplex Operations
- Auto Dial in Pulse, Tone & Tandem
- FCC Certified and Registered
- Auto Originate and Answer Modes
- Reverse Mode Dial

Our Low Sale Price $99.95 List $149

2400 Baud External Modem

- 7 System Indicator Lights
- Both Tone & Pulse Dialing
- Built-in Speaker with Volume Control
- For all Computers

Our Low Sale Price $114.95 List $349

5¼" Floppy Disks

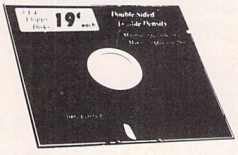
100% Certified • Lifetime Guarantee

19¢ each

Double Sided Double Density

Lots of 25

no limit



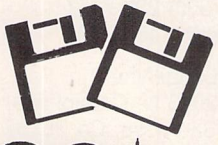
3½" Micro Disks

100% Certified • Lifetime Guarantee

Double Sided Double Density

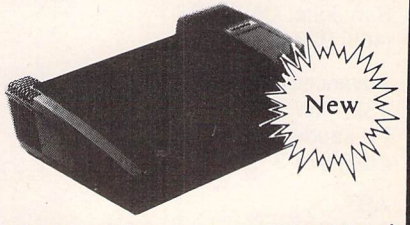
Lots of 50

no limit



99¢ each

Hi-Speed 180 CPS NLQ 180-II Printer



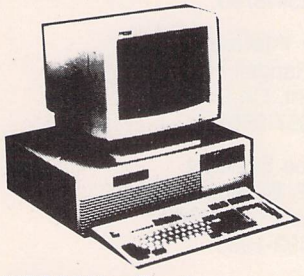
- Lifetime Warranty on Print Head

- 2 yr. Immediate Replacement
- Dot Addressable Graphics
- High Speed Dot Matrix
- Italics - Elite - Condensed - Pica
- Tractor/Friction Feed
- Centronics Parallel Port
- 8K Print Buffer
- Near Letter Quality from Front Panel
- Low Cost Adapters available

Our Low Sale Price

$149.95 List $499

"1 MEGA BYTE" 20 MHz 0 WAIT 386 AT COMPUTER



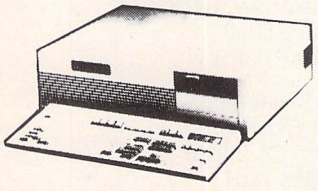
- 1 MEG RAM on Board
- I/O Board - Parallel - Serial - Game Ports
- Award BIOS
- Dual Floppy/Hard Controller
- 101 Keyboard Keytronics
- Clock/Calendar
- 25 MHz Throughput
- Case with Keylock and five integral peripheral slots
- 200 Wait power supply
- 1.2 MEG Floppy Drive

Low Sale Price

$1999.95 List $2995

Imtec Multisync Monitor shown $399.95

*16 MHz 286 IBM® AT Compatible Computer



Included FREE! MS DOS & GW Basic

- 80286 16 Bit Microprocessor
- 1.2 MEG Floppy Disk Drive
- *16 MHz (Landmark CPU Rating)
- 101 Key "AT Style" Keyboard for 3½" drives
- Clock/Calendar & Security Keylock
- Floppy/Hard drive Controller included
- 512K RAM Memory Installed
- Parallel & Serial Ports

Low Sale Price

$899.95 List $1995

*640K Laser Turbo XT Compatible Computer

FREE! Your Choice Migent Ability or Enrich With Purchase of Computer

- 640K Professional Turbo XT Computer
- 360K Floppy Disk Drive & Controller
- MS DOS & GW Basic
- Monochrome Card
- Parallel/Serial Ports
- Complete DOS & System Tutor Included FREE!

Our Low Sale Price

$599.95 List $1995

Monitor shown available for $79.95, List $179

VISA
MASTER CARD
COD

Prices do not include Shipping Charges. Call to get Your Lowest Delivered Cost. We insure all shipments at no extra cost to you! All packages are normally shipped UPS Ground. 2nd Day or Overnight delivery available. Minimum shipping charge per order is $3.75, Illinois residents add 6½% sales tax. We ship to all points in the U.S; Canada, Puerto Rico, Alaska, Hawaii, Virgin Islands and APO-FPO. (Monitors only shipped in Continental USA) Prices and availability subject to change without notice.

Names and Addresses

For more information about the products discussed in this buyer's guide, contact the manufacturers at the addresses listed below:

ACER Technologies
401 Charot Ave.
San Jose, CA 95131
(408) 922-0333

Advanced Microcomputer Systems
1321 NW 65th Pl.
Ft. Lauderdale, FL 33309
(305) 975-9515

AST
2121 Alton Ave.
Irvine, CA 92714-4992
(714) 863-1333

ATD
Advanced Transducer Devices
235 Santa Ana Ct.
P.O. Box 62306
Sunnyvale, CA 94086
(408) 720-1942

Boca
6401 Congress Ave.
Boca Raton, FL 33487-2841
(407) 997-6227

Chrislin Industries
313 32 Via Colinas
Westlake Village, CA 91362
(800) 468-0736
(818) 991-2254

Computer Elektronik Infosys
of America
512-A Herndon Pkwy.
Herndon, VA 22070
(703) 435-3800

Computer Peripherals
667 Rancho Conejo Blvd.
Newbury Park, CA 91320
(800) 854-7600
(805) 499-5751

DFI
Diamond Flower Electric
Instruments (USA)
2544 Port St.
West Sacramento, CA 95691
(916) 373-1234

Everex
48431 Milmont Dr.
Fremont, CA 94538
(415) 498-1111

Fivestar Electronics
1621 W. Crosby
Carrollton, TX 75006
(800) 752-5555
(214) 242-7000

ICS Computer Products
5466 Complex St.
Suite 208
San Diego, CA 92123
(619) 279-0084

IDEAssociates
29 Dunham Rd.
Billerica, MA 01821
(508) 663-6878

Intel
Mail Stop C03-07
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124-6497
(503) 629-7354

Legacy Technologies, Ltd.
4804 Superior St.
Lincoln, NE 68504
(800) 228-7257
(402) 466-8108

Longshine
2013 N. Capitol Ave.
San Jose, CA 95132
(408) 942-1746

Magitronic Technology
9-02 43rd Rd.
Long Island City, NY 11101
(800) 227-5454

Megahertz
4505 S. Wasatch Blvd.
Salt Lake City, UT 84124
(801) 272-6000
(800) LAPTOPS

Micro Mainframe
322 E. Bidwell
Folsom, CA 95630
(916) 985-7501

Micron Technology
2805 E. Columbia Rd.
Boise, ID 83706
(800) MICRON-1
(208) 386-3800

Monolithic Systems
84 Inverness Cir. E
Englewood, CO 80112
(303) 790-7400
(800) 525-7661

Newer Technology
1117 S. Rock Rd.
Wichita, KS 67207
(316) 685-4904
(800) 678-DRAM

PC Tech
907 N. 6th St.
Lake City, MN 55041
(612) 345-4555

PC Technologies
704 Airport Blvd.
Box 2090
Ann Arbor, MI 48106
(800) 821-3086
(313) 996-9690

Piiceon
1996 Lundy Ave.
San Jose, CA 95131
(408) 432-8030

Quadram
One Quad Way
Norcross, GA 30093
(404) 564-5566

Star Gate Technologies
29300 Aurora Rd.
Solon, OH 44139
(800) 782-7428
(216) 349-1860

STB Systems
1651 N. Glenville
Suite 210
Richardson, TX 75081
(214) 234-8750

Suntek Information
5369 Randall Pl.
Fremont, CA 94538
(415) 657-0567

Tall Tree Systems
2585 E. Bayshore Rd.
Palo Alto, CA 94303
(415) 493-1980

Tecmar
6225 Cochran Rd.
Solon, OH 44139-3377
(216) 349-1009

Veritek
1320 #11B Grand Ave.
San Marcos, CA 92069
(619) 744-2313

Wells American
3243 Sunset Blvd.
West Columbia, SC 29169
(803) 796-7800

PC

ONLY
$2.79
PER DISK
FOR 1 - 9 DISKS

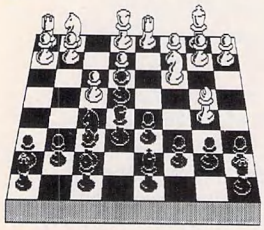
INCREDIBLE SOFTWARE

Public Domain and Shareware for IBM and Compatible Computers
Thousands of Programs Available to Meet Your Every Computing Need.
We Have The Latest Updates ★ Software Is Guaranteed ★ Prompt Delivery!

ONLY
$2.49
PER DISK
FOR OVER 10 DISKS

GAMES

JETSET FLIGHT SIMULATOR (102) Fly your jet in zero visability.
3-D CHESS (GAME9) Best around! Play in 2-D or 3-D mode. Play back moves and save games. Great!



MONOPOLY (118) Great graphics.
DND (119) Similar to Dungeons and Dragons.
GLOBAL THERMAL NUCLEAR WAR (105) A game before its time
EGA RISK (GM11) World domination in terrific color. Also EGA Asteroids.
SLEUTH (117) Murder mystery similar to the board game "CLUE."
CARD GAMES (109) Includes Canasta, Hearts, Poker and Bridge.
18 HOLE MINIATURE GOLF (176) Time honored game.
LAS VEGAS (175) Includes Craps, Roulette, Poker, etc. CGA required. Basic on some.
WHEEL OF MISFORTUNE (181) Guess the word, spin the wheel and watch out!
DIGITAL LEAGUE BASEBALL (GM40) Pick your team and players. Good graphics.
CRIBBAGE (173) Also includes Firefight, T-Road, Slot, Nuke, etc. Requires Basic.
BRAIN TEASERS Vol 1.0 (281) Questions in over 25 categories.
SOLITARE (GM41) Four different games. CGA required.
TRIVIA GAME (130-131) (Two disks) Comprehensive trivia game.
BRIDGE PAL (171) Contract or duplicate bridge. Includes tutorial. Very good.
CENTIPEE (113) Just like the arcade game Centipede.
FLIGHTMARE (112) Futuristic fighter pilot game.
BASIC GAMES (107) Includes Pac-man, Lunar Lander, StarTrek, Breakout and others. Requires Basic.
STRIKER (110) Fly helicopter through enemy.

HOUSEHOLD

MEALMATE (2014) Plan your meals with this database of nutritional information.
FASTBUCKS (799) Menu-driven home finance system. Easy to utilize.
HOME INVENTORY (1966) Household inventory system. Create your own categories. Includes estate and will planning.
VIDEO TAPE LIBRARY (1998) Catalog your video tape library. Menu-driven.
RECIPES V1.0 (2011) Over 125 recipes. Adjust serving sizes from 1-99.
LITTLE BLACK BOOK (2606) Creates pocket sized address book. Prints mini-alphabetized pages.
VEHICLE MANAGEMENT SYSTEM (2013) Predicts auto repairs, tracks MPG, etc.

RELIGION

THE BIBLE (3301-3306) (6 disks) Old Testament KJV. Req. hard disk.
THE BIBLE (3307-3308) (2 disks) New Testament KJV. Req. hard disk.
THE BIBLE (3313-3324) (12 disks) Old Testament KJV. Uncompressed for PC's with floppy drives only.
THE BIBLE (3325-3328) (4 disks) New Testament KJV. Uncompressed for floppy systems.
BIBLEQ (214) Learn the Bible with this Q-A tutorial.

WORD PROCESSING

PC-WRITE V2.71 (401-402) (2 disks) Full featured word processor like the commercial versions.
MINDREADER (430) New. Uses Artificial Intelligence to complete words and phrases. Learns your style.
PC-TYPE+ (421-423) (3 disks) Jim Button's excellent W.P. Full screen editing, mail-merge, 100,000 word spelling checker, on-screen help, etc.
LETTER WRITER (405) Easy way to write letters. Popular.

BASIC

PC-PROFESSOR (1401) Basic programming tutorial.
MORE BASIC TUTORIALS (226) More lessons in Basic.

DOS UTILITIES

DOS TUTORIAL (1301) Teaches rudiments of using DOS.
DOS TIPS (1311, 1314) (2 disks) Advanced lessons in DOS.
DOS HELP (1302) Pull-down help when problems arise.
BATCH FILE TUTORIAL (1305) Learn to use and make batch files. Save much time.
STILL RIVER SHELL (1304) Run DOS commands from a menu. Makes using DOS easy.

GRAPHICS

FINGERPAINT V2.0 (1050) Paint program. Includes 6 fonts & 81 sizes. Creates graphics with mouse or keyboard.

FLOWCHARTING (1078-1079) (2 disks) Make your own flow charts. Customize own symbols, connect lines, etc.
KEYDRAW CAD SYSTEM (1001, 1002, 1065) (3 disks) Powerful CAD drawing program. Uses keyboard or mouse. Requires CGA.
SIDEWRITER (1007) Prints text sideways. Great for spreadsheets.
3-D (1003) Create and edit 3-D objects. Requires CGA.
SIM-CGA (1027) Run programs requiring CGA on your Hercules or compatible monochrome monitor.
GRASP (1031-1032) (2 disks) Create and run graphics demo programs. Uses any graphics card. Req. CGA.
LIGHTNING PRESS (2718) Printshop clone. Library of graphics for cards, letterheads, posters, newsletters, etc. Req. CGA.
CITY DESK (2513) Simple and easy to use desktop publisher.
EGA TROPICAL FISH (1087) Turn monitor into a fish tank. CGA also.

PRINTER UTILITIES

DOT MATRIX FONTS (3061-3062) (2 disks) Print out text in different fonts. Programs for IBM Proprinter, the Epson 800/1000 series, Star NX10 and NEC printers.
LASERJET FONTS/II (2721-2722) (2 disk set) Downloadable fonts for the Laserjet Plus II.
LQ V2.1 (2724) Produces high quality text on dot matrix printers.
LINCOMATIC BANNER (2714) Make banners with different fonts & sizes.

DESKTOP ACCESSORIES

HOMEBASE V2.0 (2608, 2612, 2613) (3 disks) Outshines Sidekick. PC-Magazine Editor's Choice. Many features.
PRO-MENU (3033) Run DOS and other programs from menus. Automatic custom menu maker. Make it easy on yourself.
INSTACAL (2610) Print wall-size calendar for any month or year between 1600-2200 A.D.

DATABASE

FILE EXPRESS (803-804) (2 disks) Menu-driven, easy to use and powerful. Rated excellent by PC Magazine.
PC-FILE+ V2.0 (801, 805, 837) (3 disks) Excellent. Full-featured with help screens. by Jim Button.

SPREADSHEETS

PC-CALC+ V1.0 (512-514) (3 disks) The Complete Spreadsheet program. By Jim Button.
EZ-SPREADSHEET (509) Simple and easy to use. Great for novice.
QUBECALC (508) Unique and powerful 3-D spreadsheet.
LOTUS MACROS (601) Saves much time and effort. Requires Lotus.
LOTUS TEMPLATES (602) Ready to run. Requires Lotus.
LOTUS TUTORIAL (630) Excellent. Beginning and advanced.

BUSINESS

EZ-FORMS (1908) Menu-driven forms generator.
EZ-FORMS EXEC V2.0 (2015) Contains additional features to 1908.
EASY PROJECT V1.2 (BS27) Complete project management system.
PC-GENERAL LEDGER (701) Menu-driven accounting system. Easy.
PERSONAL FINANCE MANAGER (715) Household budget manager. Keeps track of checking, savings, and investments.
MR. BILL (702-703) (2 disks) Bill customers. Create invoices, client reports, audit trail, etc.
BIDS 'N QUOTES V0.9 (BS26) Prepares cost estimates, proposals. Does labor, material, sub-contractor costs, etc.
DOCKETMINDER V1.2 (BS25) Maintain docket for lawyer or law firm.
RENTAL PROPERTY (BS24) Keeps track of rental activity. Menu driven.
BUSINESS LETTERS (BS22—BS23) (2 disks) 650 business letters to cover all your needs. Edit with any word processor.
SBAS V1.3 (797) Small business accounting system. Menu-driven.
PRO PC-ACCT V3.0 (BS28) Integrated G/L, A/R & A/P. Menu-driven, pull-down help.
SOAR V1.92 (BS20-BS21) (2 disks) Accounts receivable program. Handles variety of services or products.
CK - CHECKBOOK V3.14 (755) Full featured checkbook with reports.
PC-PAYROLL (714) Menu-driven payroll system.

EDUCATION

FUNNELS & BUCKETS (201) Great learning game. Add, subtract, multiply & divide. Ages 5-10.
LETTERFALL V1.1 (282) Improve your typing skills. Many levels.
BEGINNING SPANISH (211) Learn basic Spanish.
SPANISH II (232) Sequel.
MATHPAK (202) Tutorial with lessons in higher mathematics.
EDUCATIONAL PROGRAMS (207) For pre-school and elementary.
ERYN'S ABC'S (270) Teaches alphabet & numbers. Computerized Etch-a-Sketch. Ages 2-6. Requires Basic.
AMY'S FIRST PRIMER (248) Teaches alphabet, numbers, counting, shapes, matching, etc. Ages 4-8. Requires CGA & Basic.
THE WORLD 3D (235) Displays maps of the world. Requires CGA.

SAN MATEO EDUCATION (283) Teaches math, chemistry & geography. Ages 8-16. Requires CGA.
SPELLING BEE (284) Grades 1-12. Requires CGA & Basic.

MUSIC

PC-MUSICIAN (302) Compose music. Save and play it back.
PIANOMAN (301) Turn your keyboard into a piano!
CHRISTMAS SONGS (311) Includes many of your favorites.

COMMUNICATIONS

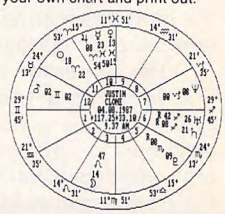
RBBS BULLETIN BOARD (1107-1109) (3 disks) Turn computer into a BBS. Industry standard.
Q-MODEM V3.1 (1101, 1102, 1143) (3 disks) Full featured modem program. Redialing.
PROCOMM V2.42 (1112-1113) (2 disks) Menu-driven modem program. Considered better than most commercial programs.

SECURITY/HACKING

COPY PROTECTION I (1219) Instructions for unprotecting Brownbag, dBaseIII, PCdraw, Printshop and many more.
COPY PROTECTION II (1220) Unprotect Report Writer, Clout, Castle Wolenstein, Dollars & Sense, Grafwriter and more.
COPY PROTECTION III (1221) Still more. Javelin, Sidekick, Spitfire, Symphony, Thinktank, and more.
VACCINE (1223) Various programs to protect against Virus & Trojan Horse schemes

MISC. APPLICATIONS

BIORHYTHM (1990) Calculate and print your own monthly chart.
DR. DATA LABEL (2327) Professional mailing list program. Print on postcards, envelopes, and any size label.
FAMILY HISTORY (2203-2204) (2 disk set) Creates files and genealogical reports.
STRESS & SHRINK (2006) Includes a stress test and a personality test.
LOTTO MASTER (1981) Play the lotteries with a scientific approach.
MEMBERSHIP SYSTEM (1984) Good for clubs, churches, etc.
HORSES (1999) Handicap system for thoroughbred racing.
HEALTH RISK (2010) Diagnose your ailments.
ASTROLOGY 9.5 (1916) Calculate your own chart and print out.



ORDER FORM

PLEASE PRINT DISK NUMBERS

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE ( ) _____

NUMBER OF DISKS _____ X $2.79 = _____

(ONLY $2.49 PER DISK FOR 10 OR MORE.
SOFTWARE ON 3.5" DISKS ARE $3.99 each.
NOTE: 2 DISK SETS ARE 2 X $2.79, ETC.)

CALIF. RESIDENTS ADD 6.5% TAX = _____

SHIPPING AND HANDLING = $3.00

(FOREIGN ORDERS ADD $7.00) = _____

MAIL CHECK OR MONEY ORDER TO: **TOTAL** = $ _____

FREEWARE UNLIMITED

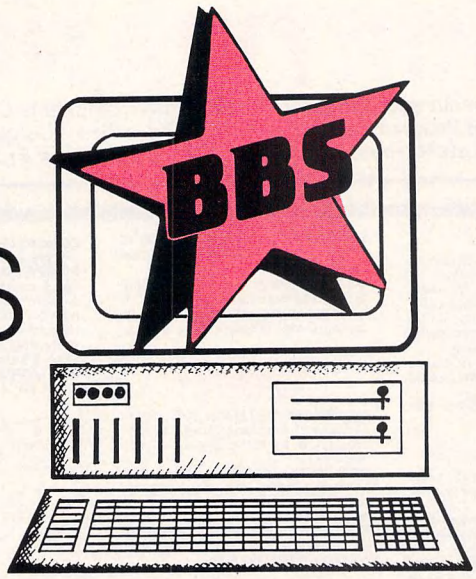
P.O. Box 685, Cardiff, CA 92007
OR CALL **(619) 436-2618**
From 8 AM to 5 PM PST Monday - Friday.
IF PAYING BY VISA OR MASTERCARD, PLEASE GIVE

NUMBER: _____

EXP. DATE: _____ SIGNATURE: _____

We also accept COD orders (add $4.00). Call or write for free catalog.
Phone orders shipped within 24 hours.
UPS Next Day and Second Day Air available.

BEST OF THE BOARDS



George Campbell

Since the last issue of *COMPUTE!'s PC Magazine* came off the presses, I've run up another enormous phone bill. The more I call local and national bulletin boards and commercial data systems, the more fascinating programs and information I discover.

The shareware industry is in terrific shape, with new software emerging every day. The quality of the programs continues to improve, with many current offerings equaling the best from the commercial software market.

Since *TIME* featured computer viruses on its front cover, questions about the safety of shareware and public domain software have intensified. The answer remains the same, however: If you obtain your software from reliable mail-order and online sources, your chances of encountering a dangerous program are still one in a million. The most famous viruses have been found in *commercial* software.

Shareware's First Lawsuit

The rash of lawsuits filed by software companies against their competitors has finally infected the shareware world. A lawsuit filed by System Enhancement Associates (SEA) against PKWARE has cast a cloud over programs that compress and store files.

System Enhancement Associates introduced the first MS-DOS utility to create and decode archival (.ARC) files. These space-saving collections of files are the way most public domain and shareware programs are distributed. An archive file is much smaller than the original file, thus saving space on hard disks and cutting transmission time.

Since then, a number of other shareware authors, including Phil Katz of PKWARE, have introduced software that performs the same function. Many of these later programs run faster and produce smaller .ARC files than the original *ARC* program from SEA.

The lawsuit filed by SEA accused Phil Katz, author of PKWARE's *PKARC*, of using source code owned by SEA. The suit was settled, and PKWARE agreed to a set of conditions that means that an entirely new version of *PKARC* is currently under development. *COMPUTE!'s PC Magazine* included *PKARC* on its magazine disk in the November 1987 issue.

I can't comment on the validity of the lawsuit since I don't have all the facts. The whole proceeding, however, has caused shareware authors to take another look at their programs, worrying that they, too, might be sued. It seems a shame that the cooperation that has characterized the shareware industry has been tainted by the specter of legal action.

What does all this mean to users of shareware software? In the case of the SEA-PKWARE suit, it has no effect. You can continue to use any version of *PKARC* in any way you like. The new postsuit versions of the PKWARE programs should be available by the time you read this.

Brown Bag Goes Shareware!

A number of shareware products have disappeared from the market. Although it's not uncommon for authors of shareware programs (such as *ProComm*) to turn to the commercial market for distribution, it's rare to see commercial software go shareware.

Brown Bag Software, publishers of programs such as *Homebase, PC-Outline,* and *PowerMenu,* has made a major move. The company is now distributing its programs, once commercial, as shareware. This exciting announcement adds even more credibility to the shareware industry and offers Brown Bag a wider distribution system.

The products entering the shareware arena include *Homebase,* a full-featured memory-resident utility that includes a calculator, word processor, database, communications program, and more. Another offering is *Easy Presentation Graphics,* a business graphics program with *Lotus 1-2-3* compatibility.

PC-Outline Plus is an outlining program that includes a spelling checker and thesaurus. Brown Bag's *PowerMenu* is a powerful hard disk–management system. *MindReader* is a word processor that thinks ahead, suggesting the next word or phrase. *Goal Seeker* can help you use your spreadsheet by manipulating data. Finally, *RAMTest* can spot defective RAM chips and tell you which chip is bad before it causes problems.

You can find the new Brown Bag shareware versions on major bulletin boards as well as on GEnie and CompuServe. They're also available on Brown Bag Software's own BBS, which you can call at (408) 371-7654. Finally, the company offers an evaluation kit containing the shareware versions of all seven of its programs for $30.00, plus $7.50 for shipping and handling. The set comes on 11 disks.

For more information, contact Brown Bag Software, Box 60000, San Francisco, California 94160-1719. You can also order with a credit card by calling (800) 523-0764. In California, call (408) 559-4545.

Mail-Order Shareware

In an earlier "Best of the Boards," I mentioned several mail-order shareware distributors. Since then, I've discovered two others that offer excellent selection and service.

In many cases, ordering shareware programs by mail can save money. Online charges from commercial systems like GEnie and CompuServe can add up quickly, often exceeding the cost of a disk from one of these firms.

T & Z Software

This Florida shareware distributor offers an excellent selection of the best shareware programs. Prices for the distribution disks begin at $4.75, with a minimum order of three disks. T & Z Software makes a strong effort to find new programs and keeps its catalog current. The company will send you the latest catalog at no charge. Contact T & Z Software, P.O. Box 780217, Sebastian, Florida 32978-0217.

PDN

PDN offers a catalog of public domain programs and shareware that is different from most others. The catalog is a regularly issued newsletter containing the latest shareware news, program reviews, and other information. The company also has a unique pricing strategy. You pay just for the programs you want. Prices range from 25 cents, for small utilities, to $10.00, for full-blown applications. Contact PDN, P.O. Box 42441, Cincinnati, Ohio 45242; (800) 626-2720 or, in Iowa, (800) 544-3825.

The Shareware World: What's Hot

VGIF36

Standards for graphics files vary widely. Because files produced by one graphics program often can't be read by other programs, a new standard is emerging. The GIF graphics standard, introduced on CompuServe, is designed to be a universal format. Hundreds of images are already available. Version 3.6 of VGIF lets you view these .GIF files on your CGA, EGA, or VGA system. It also converts .GIF files into many other formats, allowing you to import a .GIF file into another program. Registration is only $10.00. You can find the program on most BBS systems as VGIF36.ARC, or you can contact the author, Bob Montgomery, at 123 Parsons Road, Longwood, Florida 32779.

Read and Run (RNR)

This brand-new program allows you to read ASCII text files or run any program from a menu. If you specify all files with the *.* wildcard, *Read and Run* shows you a menu of text files, with another menu of program files below. Press a key and you can browse through a text file or run one of the programs. By including codes in a text file, you can even have multicolored boxes in the text. Designed for shareware authors or on-disk publishers, the program fills a long-empty niche. Even if you just want to send a disk to a less experienced user, you might find the program worth the $19.00 registration fee.

Look for the file RNR.ARC on bulletin boards or contact Techserve, P.O. Box 70056, Bellevue, Washington 98007.

This Issue's Programs

The disk included with this issue of *COMPUTE!'s PC Magazine* offers five useful and entertaining programs chosen from the best of the current shareware and public domain offerings.

HDtest

The first program on the list, *HDtest*, is for everyone who has a hard disk drive or who is thinking about adding one. Written by Jim Bracking of San Jose, California, the program is one of the most comprehensive hard disk utilities I've found.

If you're adding a new hard disk to your system, *HDtest* can perform a low-level format on the new drive, the first step in getting the disk going. It's essential for that job.

If you already have a hard disk, the program can perform a series of tests on your drive and controller. These tests can help you make sure your system is healthy.

HDtest can also modify your disk's interleave factor. The interleave factor, set when you do a low-level format, determines the way the drive accesses your data. *HDtest* tests your system for the best possible interleave and then lets you modify it for the fastest possible access. While all systems may not need changing, you may be able to speed up your drive dramatically.

Best of all, the program can alter the interleave factor *without* disturbing the data already on the drive. Even so, be sure to follow the author's recommendation to back up your data before proceeding. It just makes good sense.

HDtest uses a series of drop-down menus to make navigating the program a breeze. Extensive help screens explain your options at the touch of a key. Also, any command in the program that could damage your data gives you a clear chance to abort the process.

The program requires 180K of free memory and runs on XT-, AT-, or PS/2-compatible computers. It can handle hard disks of up to 80 megabytes.

Warning: Don't run this program without reading the documentation. Use a file-browsing utility or your word processor to read the file. If you want a printed copy, give the command COPY HDTEST .DOC PRN.

Like most hard disk utilities, *HDtest* should be run from a floppy disk. In addition, you should not run it while any memory-resident programs are active.

HDtest is stored on the magazine disk as a self-extracting archive file, HDTEST.EXE. You can expand the archive by giving the command HDTEST *destination*. For example, to install the program on a floppy disk in drive B, give the command HDTEST B:. To send the expanded files to the C:\UTILITY directory on your hard disk, use the command HDTEST C:\UTILITY.

Cribbage

Cribbage is an all-time-favorite card game enjoyed by millions of people. Mike Brennon, from Wichita, Kansas, has written the ultimate cribbage game for your PC. With it, you play cribbage against the computer. Even if you're an excellent player, you'll find the computer a worthy opponent.

Cribbage runs on any IBM-compatible PC with a minimum of 256K of memory. It adjusts itself for monochrome or color systems. On EGA systems, you may want to adjust the brightness and contrast controls for the most pleasing color combination.

The manual for *Cribbage*, contained in the file CRIB.DOC, even provides the rules for playing the game in case it's new to you.

Cribbage consists of three files: CRIB.COM, CRIB.DOC, and WASCO. All three files should be on the same floppy disk or in the same directory on your hard disk.

▷

COLOR RIBBONS & PAPER

COLOR RIBBONS	RED, BROWN,	BLUE, PURPLE,	GREEN, YELLOW,
Ribbons	**Price Each**	**Black**	**Color**	**Heat Transfer**
Apple Imagewriter I/II	3.75	4.50	6.50
Apple Imagewriter II 4-C	–	10.00	–
Applescribe	–	–	–
Citizen 120 D	5.00	6.00	7.95
Commodore MPS	CALL FOR PRICE		
Epson LX 800	3.75	4.25	6.75
Epson MX/FX/RX 80	3.75	4.25	6.75
IBM Proprinter 4201	5.75	7.75	–
Okidata 82/92/93	1.75	2.25	4.50
Okimate 10/20	4.50	5.00	–
Panasonic KX-P 1090	6.75	7.75	–
Seikosha SP 800/1000	5.25	6.50	7.95
Star SG 10	1.75	2.25	4.50
Star NX10/NL10	5.00	6.00	7.95

COLOR PAPER

BRIGHT PACK—200 Sheets/50 each color: Red, Blue, Green, Yellow. 9 1/2 x 11 — $10.90/pk.

PASTEL PACK—200 Sheets/50 each color: Pink, Yellow, Blue, Ivory. 9 1/2 x 11 — $10.90/pk.

T-SHIRT RIBBONS (Heat Transfer) — Call For Price.

COLOR DISKETTES

5 1/4" DS/DD Rainbow Pack. 10/pack — $12.50

For ribbons & paper not listed above, call for price & avail. Price & spec. subject to change w/o notice. Min. order $25.00. Min. S & H $3.50. Add $2.25 C.O.D. add'l. IL res. add 6.25% tax. MC & Visa accepted.

RENCO COMPUTER PRINTER SUPPLIES
P.O. Box 475, Manteno, IL 60950 U.S.A.
1-800-522-6922 • (IL) 1-800-356-9981
815-468-8081

Save on BROWNOUT protection!

LINE CONDITIONER

keeps power constant during voltage sags and power surges!

Prevents damage and downtime on computers, phone systems, cash registers, etc. by providing full voltage support when AC input power varies up or down. Maintains constant output of 120V. *Line Stabilizer* is a stepped transformer system that has *higher* efficiency than CVT's (constant voltage transformers) and gives lower waveform distortion at FAR LOWER COST. Built-in spike and noise suppression. 1-Year warranty!

1200-Watt, 4 Outlet	1800-Watt, 6 Outlet
ONLY $199	**ONLY $259**

Order toll free 1-800-662-5021
IN ILLINOIS CALL 1-312-648-2191 OR MAIL COUPON

INDUS-TOOL, 730 W. Lake Street
Dept. CPC, Chicago, IL 60606

Enclosed is $_____or charge on
☐ MasterCard ☐ Visa ☐ *Expires*_____
Card No. _____
Send ☐ 1200-Watt @ $199 ☐ 1800-Watt @ $259

Name _____
Company _____
Address _____
City,State,Zip _____
Phone _____

ERA

If you're like most PC users, you've given the command DEL *.* only to discover that you've deleted an entire disk or directory by accident. Unless you have a file-recovery utility, that mistake can be costly.

ERA, written by New York programmer Dennis Vallianos, is a replacement for the DEL command. You use it in much the same way you use DEL, but it shows you a list of files and then asks you to confirm that you want to delete them. If you use a command-line option, the program shows you the files one at a time, letting you choose whether or not to delete each file.

ERA uses very little memory and runs on any PC- or MS-DOS computer using DOS version 2.1 or later.

The program is on the magazine disk in two files, ERA.COM and ERA.DOC. Read the brief manual in ERA.DOC before using the program. If you have a hard disk, copy ERA.COM to a directory contained in your PATH statement.

FixBeep

Pennsylvania's Mike "Nifty James" Blaszczak wrote *FixBeep* to solve a small but annoying problem. If you're tired of the sound of your computer's beep, *FixBeep* lets you change that frequent reminder to any sound you like.

You can adjust the pitch and duration of the beep or even eliminate it altogether. *FixBeep* is a very small memory-resident program, ideal for inclusion in your AUTOEXEC.BAT file. It won't interfere with any other memory-resident programs.

The program won't run on Tandy computers since they use a different method for generating the beep. *FixBeep* runs on any other PC- or MS-DOS computer, however.

You'll find FIXBEEP.COM, FIXBEEP.DOC, and BEEP.BAT on the magazine disk. FIXBEEP.DOC is the manual for the program and explains how to customize your beep. BEEP.BAT is a short batch file that sounds the beep anytime you run it.

ColorSet

If your PC has CGA, EGA, or VGA graphics, you're probably tired of booting up your system with white text on a black background. There are a number of color-setting utilities available, but most of them require you to remember the numbers for the available colors.

I wrote *ColorSet* to solve that problem. To use it, give the command SEECOLOR. That brings up a screen showing all the available colors. To select the text and background colors, use the command SETCOLOR *foreground no. background no.* You can also use SETCOLOR as the last command in your AUTOEXEC.BAT file to boot up with your favorite colors.

To use the SEECOLOR command, you need to add the line DEVICE=ANSI.SYS to your CONFIG.SYS file. For complete instructions, read the COLORSET.DOC file.

The program runs on any PC with CGA, EGA, or VGA graphics. You'll find the program in the subdirectory COLORSET. To change to the subdirectory, enter the command CD COLORSET at the A> prompt.

Shareware

The programs *HDtest* and *FixBeep* are shareware programs. When you read their documentation files, you'll see a request for a registration fee. If you like the programs and continue to use them, please honor the authors' requests. Your registration fees go directly to the authors and help them to enhance the programs and offer user support. *COMPUTE!'s PC Magazine* provides these programs as a service to its readers. **PC**

California FREEWARE

ONLY $2.99 per disk! ONLY $2.99 per disk! ONLY $2.99 per disk! ONLY $2.99 per disk!

Public Domain and Shareware for IBM™ and Compatibles, DOS™ 2.1 or higher.
Programs and Utilities to meet all your computing needs.

BUSINESS

☐ **EZ-FORMS Rev. D15 (66)** - Menu driven forms generator, misc. skeleton forms.
☐ **REAL ESTATE ANALYST (83)** - Menu driven, mortgages, interest, etc.
☐ **EXPRESSCHECK V2.14 (561)** - Checkbook program with reports. Budget
☐ **FASTBUCKS V3.18-C (191)** - Menu-driven home finance package. Easy to use. Supports a Microsoft Mouse.
☐ **IN CONTROL (174 & 175)** - (2 disk set) The ultimate prospect/client/customer tracking system. Hard drive req. Great.
☐ **BUSINESS LETTERS (303 & 304)** - (2 disk set) 650 business letters to fit all your needs. Edit w/ any word processor.
☐ **LEGAL LETTERS (611)** - 100 legal letters. Edit w/ any word processor.
☐ **MR. BILL V3.27 (311 & 312)** - (2 disk set) Time & billing package; costs, credits, reports, audit trail, etc.
☐ **PC-PAYROLL V2.45 (464)** - Menu driven payroll system; 100 employees or less.
☐ **LANDLORD V2.03 (585)** - Fast & friendly rental property mgmt.
☐ **EMPLOYEE MGMT SYSTEM (688)** - Determines requirements for jobs, tests employees/applicants, & prints report.
☐ **SOAR V1.92 (449 & 450)** - (2 disk set) Accounts receivable program. Handles a variety of services or products.
☐ **BILLPOWER V3.9 (601)** - A timekeeping, billing & bookkeeping program for small firms. Req. 450K & hard drive.
☐ **PRO PC-ACCT SYSTEM (526)** - Fully integrated G/L, A/P, A/R system. Menu driven, on-screen help, cross posting, unlimited accounts, & much more. Req 380K.

COMMUNICATIONS

☐ **QMODEM V3.1 (293 & 294)** - (2 disk set) Full featured modem program. 200 number dialing directory, etc.
☐ **PROCOMM PLUS TEST DRIVE (504)** Everything you could possibly want in a communications package. Req modem.
☐ **PC-DIAL V2.0 (466)** - Modem program by Jim Button. Smartkeys & more.

DATABASE

☐ **FILE EXPRESS V4.22 (33 & 34)** - (2 disk set) Menu driven, easy to use database for beginners to experienced.
☐ **PC-FILE + V2.0 (493 - 495)**- (3 disk set) Full-featured database; help screens, menus, macros. One of the best. J Button

EDUCATION

☐ **COMPOSER (3)** - Create, save, edit, play, & print your music.
☐ **LETTERFALL V1.1 (119)** - Improve your touch typing skills; 16 levels.
☐ **ALGEBRA TUTOR (577)** - By Professor Weissman, teaches operations. CGA req.
☐ **BEGINNING SPANISH (121)** - Teaches vocabulary, phrases, etc. Basic required.
☐ **THE WORLD 3D (127)** - Display maps of the world. CGA required.
☐ **FUNNELS & BUCKETS V2.0 (130)** - Great learning game; add, subtract, multiply, & divide. Ages 5 - 10.
☐ **MATH-WHIZ (188)** - Teaches various math operations. Ages 5 and up. You choose the level. Basic required.
☐ **AMY'S FIRST PRIMER (133)**- Alphabet, numbers, counting, shapes, matching, etc. Ages 4 - 8. CGA & Basic req.
☐ **GRADE GUIDE V2.5 (118)** - Store, retrieve & analyze students' grades.
☐ **PC-QUIZZER V2.1 (308)** - A testing and training package. Requires 384K.
☐ **ANIMAL MATH/MOSAIC (181)** - Count objects & graphic learning tool. Ages 4 & up . CGA required.

GAMES

☐ **SLEUTH V4.1 (89)** - Murder mystery game similar to the board game "CLUE".
☐ **BLACKJACK (95)** - Advanced blackjack game with tutor, multiple players. Best one yet. CGA or Hercules.
☐ **MONOPOLY V6.7 (106)** - Just like the board game, 2 to 4 players. CGA req.
☐ **CUNNING FOOTBALL (693)** -A dynamic game with excellent graphics. EGA req.
☐ **LAS VEGAS (116)** - Craps, Roullete, Poker, & more. CGA req., Basic on some.
☐ **3D CHESS V1.01 (215)** - Excellent chess game. Switch between 2D & 3D.
☐ **SAM SPADE V1.0A (226)** - Great detective game. Mazegame; creates mazes.
☐ **SUPER PINBALL (212)** - 5 different games. CGA required.
☐ **WORDPLAY (367)** - Wheel of Fortune clone. You provide the prizes. CGA req.
☐ **ADVENTURE GAME TOOLKIT (595 & 596)** - (2 disk set) Create & play your own text adventure games. 2 levels.
☐ **PC-Pro GOLF (667 & 668)** - (2 disk set) A graphic based golf game. CGA req.

GRAPHICS

☐ **FINGERPAINT V2.0 (282)** - Paint program; 6 fonts, 81 sizes . Use for desktop publishing, slideshow & cartoon playing. CGA, EGA, or Hercules.
☐ **PRINTMASTER GRAPHICS (319)** - Over 200 graphics. Printmaster req.
Order Disk #320 for Printshop version.
☐ **PRINTMASTER GRAPHICS / 2 (549)** - Contains 169 graphics relating to men, women & people. Printmaster req.
Order Disk #589 for Printshop version
☐ **PRINTMASTER GRAPHICS / 3 (550)** - Contains 165 graphics relating to animals & transportation. Printmaster req.
Order Disk #590 for Printshop version
☐ **PRINTMASTER GRAPHICS / 4 (701)** - Contains 86 graphics relating to computers, music & medical. Printmaster req.
Order Disk #702 for Printshop version
☐ **PC-KEY-DRAW (534-536)** - (3 disk set) - Combination CAD & paint program for power & flexibility. Does drawing, paint, text (multiple fonts), animation, etc.
☐ **DANCAD 3D V2.0E (424 & 425)** - (2 disk set) Advanced 2D/3D drafting program. Stereoscopic 3D wire frame animation. EGA, CGA, Hercules. 640k req.
☐ **CITY DESK V7.01 (197)** - Desktop publisher with graphics capability.
☐ **FLODRAW V1.00 (542 & 543)** - (2 disk set) Produces flowcharts, organizational charts, system diagrams, etc. CGA required.

LANGUAGE

☐ **TURBO "C" TUTOR (489 & 490)** - (2 disk set) 14 lesson tutorial; learn to program in "C" language.
☐ **"C" LANGUAGE V2.1 (299 & 300)** - (2 disk set) Complete programming environment. Source, compiler, samples.

NOVELTY

☐ **STRESS & SHRINK (74)** - Stress - stress test. Shrink - personality analysis.
☐ **HORSERACING (343)** - Handicapping for thoroughbreds.
☐ **ASTROLOGY V9.5 (284)** - Read your own chart from stars, moon, etc.
☐ **RECIPES V1.0 (445)** - Over 125 recipes, adjust serving sizes from 1-99.
☐ **EDNA'S COOKBOOK V1.16 (566)** - Record, file, list & print recipes. 2 drives
☐ **WEIGHT CONTROL (586)** - Programs designed to get rid of unwanted inches.

PRINTER UTILITIES

☐ **LQ V2.26 (509)** - Produces high quality text on dot matrix printers. Multiple fonts with print spooler.
☐ **LASERJET FONTS/I (327)** - 30 + downloadable fonts for Laserjet Plus/II.
☐ **LASERJET FONTS / II (471 & 472)** - (2 disk set) More downloadable fonts for HP Laserjet Plus/II. Helvetica, Script, etc.
☐ **SPOOLERS (48)** - Contains 4 different print spoolers. A must for computerists.
☐ **ON-SIDE (560)** - Sideways printing program. Req. IBM or Epson printer.

SPREADSHEET

☐ **PC CALC + V 1.0 (537-539)** - (3 disk set) - Complete program. Buttonware.
☐ **LOTUS PROGRAMS (28 - 32)** - (5 disk set) Contains as many applications and utilities that we could find. Requires Lotus
☐ **AS EASY AS V3.0 (302)** - Lotus clone. 52 column sheet, graphing, supports functions of 123, "WKS" files, etc.
☐ **LOTUS LEARNING SYSTEM (458)** - A tutorial that covers overview, applications, etc. Lotus NOT required for tutor.

UTILITIES

☐ **DISK COMMANDO V2.0 (218 & 219)** - (2 disk set) Norton Advanced Utilities clone. Many features.
☐ **SIM-CGA (220)** - Great for most programs that need color (CGA) to run.
☐ **HOMEBASE V2.5 (528-530)** - (3 disk set) Great desktop organizer; linear database, editor/word processor, calendar appt. book, cut/paste operations, etc.
☐ **DOS HELP (255)** - Help screen for DOS commands, functions & batch files at your fingertips. For DOS 3.XX.
☐ **DOS TUTORIAL V4.4 (256)** - Menu driven, learn to use your computer.
☐ **LIST V6.2A (274)** - Best utility for viewing documentation or any ASCII file.
☐ **AUTOMENU V4.01 (280)** - Access programs, batch files, commands, etc.
☐ **ALT V1.05 (581 & 582)** - (2 disk set) Puts the power of Sidekick, Superkey & Norton Utilities, rolled into one at your fingertips. Hard drive required.
☐ **VACCINE (541)** - Various programs to fight against the "VIRUS" & "TROJAN HORSE" programs. A MUST FOR ALL...
☐ **BEST UTILITIES (540)** - Over 40 of the best utilities we could find.

WORD PROCESSING

☐ **SIDEWRITER (6)** - "Sideways" printing; great for spreadsheets.
☐ **CATALIST V3.2 (163 & 164)** - (2 disk set) One of the most powerful mailing lists on the market. Excellent.
☐ **PC-WRITE V3.0 (9 & 10)** - (2 disk set) Full featured word processor; all the features of the expensive one's.
☐ **LETTERHEAD (69)** - Create and print your own letterhead on letters and envelopes. IBM/Epson comp. printer req.
☐ **GALAXY V2.3 (11)** - Easy to use word processor; menus & quick keyboard commands. Lots of features.
☐ **WORDPERFECT MACROS (189)** - Over 80 macros for Wordperfect V5.0.

WHAT'S NEW?

☐ **COMPASS (694)** - Interactive, menu-driven accounting, word processor, database, spreadsheet, calendar, on-line help screens & more.
☐ **MASS APPEAL (630)** - Superb mailing list manager. Requires hard drive.
☐ **SELECT-A-COLLEGE 88-89 (636)** - What to look for in a college, plus describes colleges and helps in the application process.
☐ **PERSONAL POET (718)** - Create custom poems from a variety of choices.
☐ **HOME BARTENDER GUIDE (708 & 709)** - (2 disk set) Recipes for 149 different drinks.
☐ **GRASP V1.10C (689 & 690)** - **(2 disk set)** A simple graphics programming psuedo-languange.
☐ **THE NUTRITIONIST (670 & 671)** - (2 disk set) Rapidly and comfortably evaluate foods for the proper nutriotional content.
☐ **FORTUNE TELLER V1.0 (675)** - Contains various programs for foretelling the future. Loads of fun.
☐ **EGA TREK V1.0 (677)** - Fight the Klingons and Romulans. Go where no man has gone before. Great graphics. EGA required.
☐ **INSTACALC V2.50 (697)** - A full-powered, memory resident spreadsheet.

THE PERFECT GIFT FOR YOUR VALENTINE FROM CALIFORNIA FREEWARE. ORDER NOW!!!

ORDER FORM

NAME _____
ADDRESS _____
_____
CITY _____ ST ___ ZIP _____
PHONE (_____) _____

Multiple disk sets count as the # of disks in a set @ $2.99 each.

3.5" media - $3.99 ea
# of 5.25" disks ___ @$2.99= _____
CA Res. Sales Tax (6.5%) = _____
Shipping & Handling = 3.00
Orders shipped UPS ground
TOTAL = $ ========

Canada orders add $2.00 more, International orders add $7.00more for Shipping & Handling. Payment must be in US funds.

Mail order form & check or money order to:

California FREEWARE
1466 Springline Dr. Dept V
Palmdale, CA 93550
(805) 273-0300

Hours: M-F 8 am - 4 pm

Call or write for a free catalog containing over 700 disks of quality software.

Phone orders placed before 12 pm PST sent same day.

CPC289

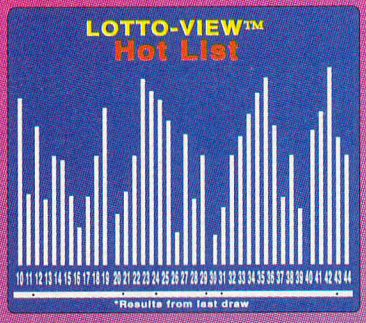
VISA MasterCard MEMBER DIRECT MARKETING ASSOCIATION

Sizzle'n.
Hot Lotto™
Sophisticated but Friendly Lottery Software
Ups Your Odds Over 1500%!

"The second week I had the program, I had 2 tickets with 5 correct numbers $5700.00!! Both tickets shared numbers that, combined, would have won 54 million dollars!". - B. Whittaker, Florida

"...Uses elaborate number crunching to predict probable future numbers ... will allow the serious user to greatly expand analysis with little effort..." -Computer Shopper Magazine

View the Stats with Ease!



Any statsitical analysis is yours at a key stroke with Lotto-View™.

Order now! The world's ultimate lottery software.

Call 1-(800)-456-5825 or 1-(206)-246-3057
Lotto Pro™ from $19.95 to $79.95
or contact your local software dealer.

Micromedia™
High Performance Software

HOW TO USE THE DISK

Every issue of *COMPUTE!'s PC Magazine* includes a 5¼- or 3½-inch disk (newsstand copies contain 5¼-inch disks only; subscribers get their choice). If you experience a problem with the disk, please contact us at (919) 275-9809 between 9:00 a.m. and 4:30 p.m. Eastern time, Monday through Friday.

Before you begin using the disk, we highly recommend making a back-up copy and keeping the original in a safe place. Follow these instructions:

Computers with two floppy disk drives: Put your working copy of DOS in drive A and enter DISKCOPY A: B: at the DOS prompt. When DOS prompts you, remove the DOS disk from drive A and replace it with the magazine disk. Put a blank disk in drive B and press any key to make the copy.

Computers with hard disk drives: Put the magazine disk in drive A and enter COPY A:*.* C:*directory* (substituting your own directory name for *directory*). You can specify any directory of your choice, but it must already exist on the hard disk. For instructions on creating directories, see your DOS manual.

Computers with one floppy disk drive: Put your DOS disk in the drive and enter DISKCOPY. Then follow the instructions on the screen.

Running Magazine Programs

Descriptions of all the files on the disk are contained in a file named README. You can display this file on the screen by entering TYPE README at the DOS prompt. Hold down the Ctrl key and press NumLock (HOLD on Tandy machines) to pause scrolling; press any other key to resume it. (Some computers have a special Pause key for this purpose.) You can read the file more easily by loading it into your word processor or by printing it with the DOS command COPY README PRN.

Before running the disk programs, follow the instructions in the articles. Remember that some files on the magazine disk are not executable programs—for instance, some files may contain only the data for a program.

Archive Files

Programs on the disk are often stored as self-extracting archives. When you enter the archive's name at the command-line prompt, the files will automatically extract. *Do not attempt to extract the files on a copy of the magazine disk—there may not be enough disk space for the files.*

To expand an archive and extract its files, just enter a command of the form *filename drive:\directory.* For example, to install an archive called STARPLAY on drive C in the directory \COMPUTE, give this command at the A> prompt: STARPLAY C:\COMPUTE. If you have a floppy-only system, you can install the programs on another floppy disk with this command: STARPLAY B:.

Programs That Require DOS

Some programs on PCs and compatibles require COMMAND.COM (a DOS file) to operate. Floppy drive systems look for COMMAND.COM on drive A, so it's best to keep a disk with COMMAND.COM in drive A. If there's room on your backup copy of the magazine disk, you can copy COMMAND.COM onto it and run the magazine programs from drive A. If there isn't room, put a COMMAND.COM disk in drive A and the backup copy of the magazine disk in drive B. Then run the magazine programs from drive B.

If the system you're using has one floppy drive and no hard drive, copy COMMAND.COM onto your backup disk if there's room. If there isn't room, copy some of the programs you want to use from your backup disk to a disk with COMMAND.COM. Then run the programs from that disk.

If the system you're using boots from a hard drive, the computer can find COMMAND.COM on the hard drive. If you boot a hard drive system from a floppy disk in drive A, you should keep a COMMAND.COM disk in drive A.

With the exception of the featured programs in our "Best of the Boards" column, the entire contents of *COMPUTE!'s PC Magazine* and the disk are copyright 1988 by COMPUTE! Publications, Inc., all rights reserved. The programs are intended for use by the purchaser of the magazine and may not be distributed to others in any form. We ask that you respect the copyright. PC

NO MEMBERSHIP FEES

$2.75 Per Disk Ten or More

So Much for So Little...

FROM

Software Excitement!

NO MEMBERSHIP FEES

$3.25 Per Disk Less than Ten

So easy to Use

- No Computer Experience Necessary
- Instructions for each Order
- FREE Phone Support
- *The BEST User Supported Software*

So Easy to Order

- No Membership Fees
- FREE 800-# for Orders
- FREE Same-day Shipping with orders of 5+
- UPS 2nd Day Air Service when you need it Now!
- FREE Catalog
- Your Satisfaction Guaranteed

BUSINESS/ACCOUNTING/FINANCE

- ☐ **Home Budget Manager** - Helps you design and stick to a budget.
- ☐ **E-Z Forms Executive** - Makes it easy to generate any type of business form.
- ☐ **Express Check** - A fantastic checkbook program with reconciliation features.
- ☐ 3 **PC-Calc+** - One of the most powerful and complete spreadsheet packages available. The features include the ability to import 1-2-3 files.
- ☐ **Small Business Accounting System** - All small business owners need this one.
- ☐ **Home Inventory** - Keeps track of all your personal items.
- ☐ **PC-Stock** - Tracks your stocks and charts the trends. (CGA)
- ☐ 2 **PC-Write 2.71** - This word processing system is one of the most popular because of its many features and ease of use.

DATABASE

- ☐ **MailMaster** - Full-featured mail list manager.
- ☐ 3 **PC-File+** - A powerful DBase III+ compatible Database.

EDUCATION

- ☐ **Facts** - Teaches kids the states, presidents, capitals, etc (CGA)
- ☐ **Typing Tutor** - Improve your typing skills with this friendly teacher!
- ☐ **Computer Tutor** - If you are a new user or computer novice, THIS IS WHAT YOU NEED! Learn in a fun, pressure free environment.
- ☐ **Math Tutor** - Takes a fun approach in helping kids improve their math skills.
- ☐ **Geography** - Make learning fun with this geography trivia game.

TOP 40 DISK COLLECTION

- ☐ **BibleQ** - Test your Biblical IQ. It's fun, too!
- ☐ **Spanish I** - Beginning Spanish for the student.
- ☐ 2 **Lotus Learning System** - A very complete package that makes learning Lotus 1-2-3 easier and more interesting.
- ☐ **World** - This menu-driven program makes it easy to obtain information about geography (capitals, countries, and more).

UTILITIES/APPLICATIONS

- ☐ **MasterKeys** - Like the popular Norton disk file utilities, only better!
- ☐ **Desk Mates** - A disk full of Sidekick-like desk accessories.
- ☐ **AutoMenu** - Personal menu that lets you run all your programs or any DOS command with a single keystroke from an auto booting menu.
- ☐ **SideWriter** - Prints spreadsheets and text files sideways. Requires IBM Proprinter, HP Thinkjet, Epson or compatible printer for best results.
- ☐ **Banner Maker** - Make banners of various sizes and styles with this disk.
- ☐ **PianoMan** - Record, edit, and then play back your favorite tunes. Also turns the keyboard into a musical instrument ?!

GAMES

- ☐ **Striker** - Helicopter attack simulation. Risk is also included. (CGA)
- ☐ **Baseball** - A strategy oriented approach to the great game.
- ☐ **Q-Bert** - Play the famous arcade hit on your computer. (CGA)
- ☐ **Backgammon** - Play against the computer. Centipede is also included. (CGA)
- ☐ **Monopoly** - Great color and sound. (CGA)
- ☐ **JetSet** - A great jet flight-simulator.
- ☐ **Infiltration to IBM** - In this text-adventure game, you are a secret agent.
- ☐ **Adventure Addiction** - A collection of five great text adventure games.
- ☐ **PacMan & More!** - Several arcade hits including two PAC-MAN games. (CGA)
- ☐ **Wheel of Misfortune** - A really fun version of the classic TV gameshow.
- ☐ **Master the Market** - A stock market simulation game. More options and better all around play than the popular "Millionaire" game.
- ☐ **Kid Games** - A set of educational games designed to teach kids in a fun way.
- ☐ **Super Pinball** - A collection of five great video pinball games. (CGA)
- ☐ **Global Thermonuclear War** - Inspired by the movie "Wargames".
- ☐ **Video Poker/Ultima 21** - The BEST poker and blackjack games available.

THE BEST of the REST

- ☐ **Are You Ready For Calculus?** - This is an excellent pre-calculus tutor that review algebra and trigonometry.

UTILITIES/APPLICATIONS

- ☐ **Best Utilities** - Includes a spooler, RAM disk, selective delete ulitity, and more!
- ☐ **SimCGA & HGIBM** - Allows you to run many programs with require a color graphics adaptor on a monochrome system.
- ☐ **Soft-Touch 2.03** - Powerful keyboard macro package. A great timesaver!
- ☐ **HDMenu III v1.35** - Puts the programs on your hard disk on a menu. Has security features, unlimited menus, and phone dialer.
- ☐ **Fast Food** - Know the nutritional value of many of the fast food items you eat.
- ☐ **ELISA** - The famous computer psychiatrist. Disk also has a great prank program.
- ☐ **Movie Database** - Store and retrieve info about your favorites. Search according to keywords. Comes with pre-programmed info. on hundreds of movies.

BUSINESS/ACCOUNTING/FINANCE

- ☐ **PC-General Ledger** - Written by a financial exec with over 25 years experience.
- ☐ **Finance 1.0** - Determines present and compound values. Useful for bond, loan, and mortgage analysis.
- ☐ **Finance Manager II** - A powerful personal or small business bookkeeping system.
- ☐ **Point-of-Sale Inventory** - Maintain your inventory from point-of-sale.

WORD PROCESSING/DATABASE

- ☐ **PBase** - A powerful relational DBase with query language.
- ☐ **Doctor Data** - Has features found only in the best mail list managers.
- ☐ 2 **Recipes** - A complete recipe database that collects all your favorites and comes with plenty of new favorites.
- ☐ **Letter Writer** - A form-letter generator with mail-merge capabilities.
- ☐ **New York Word** - Has everything you need such as mail-merge, split screens, macros, spell checking, and more.

TELECOMMUNICATIONS

- ☐ **Pro-Comm 2.42** - A professional telecommunications package which is both versatile and easy-to-use.

EDUCATION

- ☐ **French I** - French for beginners.
- ☐ **French II** - Continues where French I left off.
- ☐ **Spanish II** - For those who wish to continue after Spanish I.
- ☐ **Japanese** - Designed for the business traveler but also useful for the student.
- ☐ **German I** - An introduction to German.
- ☐ **PC-Gradebook** - Helps teachers to record and monitor students' grades. A spelling flash card is also included.
- ☐ **Church DataBase** - Automates record keeping relating to congregation members.
- ☐ **DataBase Publisher** - Helps you put together a catalog of up to 1000 items.
- ☐ **Lotto!** - Complete system for the lotteries of most states.
- ☐ **Crossword Creator** - Create your own custom crossword puzzles easily. Great for educators as a learning aid.
- ☐ **Astrology** - Let your computer tell you what lies ahead in the stars!
- ☐ 2 **The Family History System** - Creates files of personal information including family relationships and produces standard genealogical reports.
- ☐ **PC-Musician** - Develop and play-back songs on your PC.
- ☐ **PC-Art** - Graphics drawing package for creating color pictures and designs. (CGA)
- ☐ **EDraw** - Draw designs, flowcharts, schematics, printed circuits, or just about anything you can think of.

GAMES

- ☐ **Trucker!** - Drive an 18-wheeler from LA to NY. Watch out for Smokie!
- ☐ **Las Vegas Style Craps** - Both a game and a learning tool. Allows all legal bets. Can show odds of winning for any bet. Mouse optional. (CGA)
- ☐ **Dungeons & Dragons** - Play anytime. Be your own dungeon master!
- ☐ **AdventureWare** - Five new text adventures sure to keep you intrigued.
- ☐ 2 **Trivia Towers** - A challenging trivia game for 2-6 players or teams.
- ☐ **Chess** - Challenge the computer in the classic game of chess.
- ☐ **Solitaire** - The computer deals the cards and makes sure you don't cheat!

Order Today - 1-800-444-5457

Name _____

Address _____

City _____ State____Zip____

Phone (_____) _____

Visa/MC____-____-____-____

Exp. Date _____

Sig. _____

☐ Send Catalog

Note: (CGA)=Requires Color Graphics Adapter

Disks Ordered

_____ × _____ $_____

(Add $1.00 per 3½" disk)

☐ SHIPPING $2 U.S. (FREE if you Order 5+) $4 Foreign $_____

☐ COD (add $4 if you require COD) $_____

☐ U.P.S. 2nd Day or Priority Air (Add $3) $_____

TOTAL $_____

☐ Check/MO

☐ Visa/MC ☐ COD

VISA

Software Excitement!

P.O. Box 3072 • Central Point, OR 97502

MasterCard

"Only the BEST Software for IBM PCs and Compatibles"

Arcade Volleyball

Rhett Anderson & David Hensley, Jr.
PC Version by Tim Midkiff

How do you play volleyball without hands? With your head, of course. You and an opponent each control a mutant head in this fast-paced and unusual version of America's favorite beach sport. For a real challenge, go head to head against the built-in computer opponent. The program runs on any IBM PC, XT, AT, or compatible with at least 256K of memory, DOS 2.0 or higher, and a Color/Graphics Adapter (CGA) or equivalent.

"Arcade Volleyball" is a one- or two-player arcade-style game with colorful graphics and superb, flicker-free animation. You control a high-jumping, if short of stature, expert volleyball player. It won't be long before you're executing top-notch serves, sets, and spikes.

Arcade Volleyball is written in *Turbo C* and machine language. It's a compiled program consisting of two files, AV.EXE and AV.DAT. Both files must be on the same disk for the program to run. To start the game, simply type AV at the DOS prompt.

Your Serve

When the program starts, you'll see the title screen with the main menu:

Play
PL1 Keyboard
PL2 Keyboard
Sound On
Define Keys
Set Joystick
Exit

The word *Play* is highlighted. If you press Enter, the game starts with its default settings. To change any of the settings, use the cursor-up and -down keys to move up and down through the menu. Press Enter to cycle through the options of any of the menu items.

The menu items PL1 and PL2 let you set the input device for player 1 and player 2, respectively. Move the cursor to one of these options and press Enter to cycle between input devices. You can select keyboard, joystick, mouse, or computer player.

You can turn off the sound effects by moving the cursor down to Sound On and pressing Enter to get to Sound Off.

The default keys for keyboard play are as follows: Player 1 uses Z to move left, C to move right, and X to jump; player 2 uses 1 to move left, 3 to move right, and 2 to jump. You can change these keys by selecting Define Keys from the menu. After you've pressed Enter, you're prompted for the movement keys of each player. Simply press the desired key for each prompt.

If you plan to use a joystick, you can center it by choosing the Set Joystick option. Simply follow the prompts. If you're using the keys on the numeric keypad, make sure Num Lock is on. Note that you can't use the dedicated cursor keys on Tandy computers.

The Big Serve

In the center of the court, you'll see the volleyball net. Player 1 controls the player to the left of the net; player 2 controls the player to the right. Above the court is the status line, where the score for each player is kept. A symbol beside the score shows which player has the serve.

To start the game, you and your opponent volley for the serve, with no points awarded. Position your player under the floating volleyball and press the jump key (or the joystick or mouse button) to serve. You have three chances to get the ball over the net. If you fail, you lose the serve.

The controls are easy to learn. You can run either left or right by pressing the appropriate key or by moving the joystick or mouse left or right. To jump, press the jump key or the button on the joystick or mouse. The players in Arcade Volleyball are very gifted; they can move left and right while in the air.

Use Your Head

You can hit the ball while you're on the ground or in the air. If you hit the ball while you're standing on the ground, the ball's speed stays the same. If you jump to hit the ball, the ball speeds up. You're free to bounce the ball off the ceiling or the wall behind you. If you hit the ball with the left side of your head, the ball tends to go to the left. If you hit the ball with the right side of your head, it goes right. If you hit the ball with the top of your head, the ball continues with the same horizontal velocity.

As in real volleyball, you can receive points only during your serve. However, Arcade Volleyball differs from real volleyball in several ways. First, the court is entirely surrounded by walls; there's no need to worry about hitting the ball out of bounds. Also, you can legally hit the ball as many as three times in a row. Remember, the serve doesn't have to travel over the net on the first hit. Finally, the first player with 15 points wins the game—there's no need to win by 2 points as in real volleyball. When either player reaches 15 points, the program returns you to the main menu.

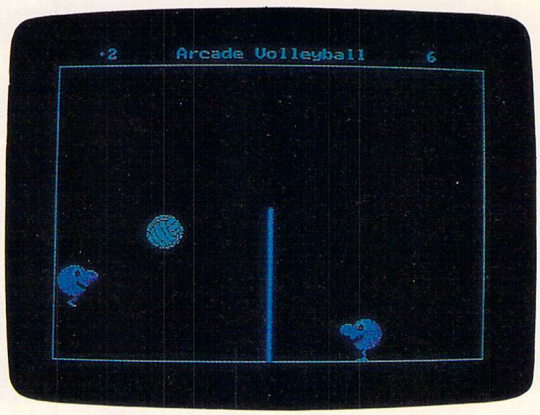
At any time during the game, you can exit to the main menu by pressing Esc. You can then return to the DOS prompt by selecting Exit.

Over, Into, and Under the Net

When you play Arcade Volleyball, your prime concern is to get the ball over the net. If the ball hits the top of the net, it can either continue over the net or bounce back to your side. Either way, the ball's velocity decreases. If the ball goes over the net, hits the opponent's wall, and bounces back to your side, you have three more chances to get the ball over the net.

If the ball hits the side of the net, it rebounds to you. Don't lose your composure; try to make the shot.

If the ball hits the floor on your side of the court, you lose your serve—or a point, if your opponent served. Also, be sure to keep the ball from going under the net. This is considered the same as hitting the floor.



It's heads up for "Arcade Volleyball."

Playing Tips

The key to the game is learning the angles. Watch the ball carefully as you play. If you jump to hit the ball, it speeds up and the angles change. The players' horizontal movement is limited. And be sure to use the walls and net to your advantage. Careful use of these obstacles is the best way to confuse your opponent. **PC**

John Klein

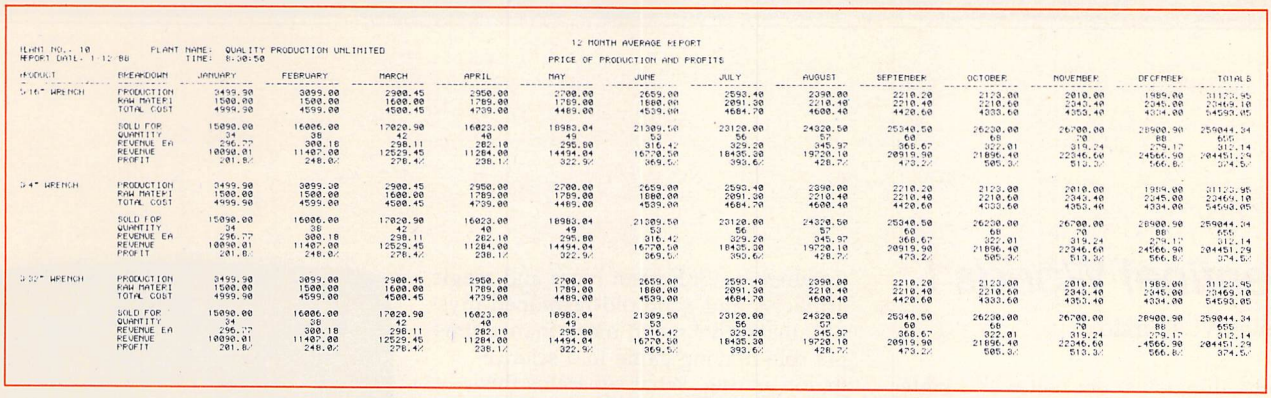
Don't let your printer chop off your spreadsheets: Print them the way they should be printed—sideways. With "Spin 'n' Print," you can take any text file, spin it around on its side, and print it on a standard dot-matrix printer. The program runs on any IBM PC, XT, AT, or compatible with at least 256K of memory, DOS 2.0 or higher, and a Color/Graphics Adapter (CGA) or equivalent.

Spreadsheets and databases are wonderful tools. With a spreadsheet, you can enter and organize data and then perform calculations that produce still more data. Databases allow you to store and perform operations on mountains of information with electronic ease. Eventually, however, you'll want to print this information. That's where the trouble begins—the printer can't normally display more than 80 columns of information. Reducing the print size may help, but then your printout will be hard to read.

That's when you need "Spin 'n' Print." Spin 'n' Print is a sideways-printing program: It takes an ASCII text file created by your word processor, database, or spreadsheet and prints it sideways on your printer. Using Spin 'n' Print, you can print long lines of text without losing the end of each line. You can print any size of text, from 1 to 20 characters per inch.

Getting Started

You'll find Spin 'n' Print on the magazine disk in a file called SPIN.EXE. To run it, type *SPIN* on the command line. When you run the program, you're



PLANT NO.: 10 PLANT NAME: QUALITY PRODUCTION UNLIMITED
REPORT DATE: 1-12-88 TIME: 8:30:50

12 MONTH AVERAGE REPORT
PRICE OF PRODUCTION AND PROFITS

PRODUCT	BREAKDOWN	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTALS
5/16" WRENCH	PRODUCTION	3499.90	3099.00	2900.45	2950.00	2700.00	2659.00	2593.40	2390.00	2210.20	2123.00	2010.00	1989.00	31123.95
	RAW MATERI	1500.00	1500.00	1600.00	1789.00	1789.00	1880.00	2091.20	2210.40	2210.40	2210.60	2345.40	2345.00	23469.10
	TOTAL COST	4999.90	4599.00	4500.45	4739.00	4489.00	4539.00	4684.70	4600.40	4420.60	4333.60	4355.40	4334.00	54593.05
	SOLD FOR	15090.00	16006.00	17020.90	16023.00	18983.04	21309.50	23120.00	24320.50	25340.50	26200.00	26700.00	28900.90	259044.34
	QUANTITY	34	38	42	40	49	53	56	57	60	68	70	88	555
	REVENUE EA	296.77	300.18	298.11	282.10	295.80	316.42	329.20	345.92	368.67	322.01	319.24	279.17	312.14
	REVENUE	10090.01	11407.00	12529.45	11284.00	14494.04	16770.50	18435.20	19720.10	20919.90	21896.40	22346.60	24566.90	204451.29
	PROFIT	201.8%	248.0%	278.4%	238.1%	322.9%	369.5%	393.6%	428.7%	473.2%	505.3%	513.3%	566.8%	374.5%
3/4" WRENCH	PRODUCTION	3499.90	3099.00	2900.45	2950.00	2700.00	2659.00	2593.40	2390.00	2210.20	2123.00	2010.00	1989.00	31123.95
	RAW MATERI	1500.00	1500.00	1600.00	1789.00	1789.00	1880.00	2091.20	2210.40	2210.40	2210.60	2345.40	2345.00	23469.10
	TOTAL COST	4999.90	4599.00	4500.45	4739.00	4489.00	4539.00	4684.70	4600.40	4420.60	4333.60	4355.40	4334.00	54593.05
	SOLD FOR	15090.00	16006.00	17020.90	16023.00	18983.04	21309.50	23120.00	24320.50	25340.50	26200.00	26700.00	28900.90	259044.34
	QUANTITY	34	38	42	40	49	53	56	57	60	68	70	88	555
	REVENUE EA	296.77	300.18	298.11	282.10	295.80	316.42	329.20	345.92	368.67	322.01	319.24	279.17	312.14
	REVENUE	10090.01	11407.00	12529.45	11284.00	14494.04	16770.50	18435.20	19720.10	20919.90	21896.40	22346.60	24566.90	204451.29
	PROFIT	201.8%	248.0%	278.4%	238.1%	322.9%	369.5%	393.6%	428.7%	473.2%	505.3%	513.3%	566.8%	374.5%
3/32" WRENCH	PRODUCTION	3499.90	3099.00	2900.45	2950.00	2700.00	2659.00	2593.40	2390.00	2210.20	2123.00	2010.00	1989.00	31123.95
	RAW MATERI	1500.00	1500.00	1600.00	1789.00	1789.00	1880.00	2091.20	2210.40	2210.40	2210.60	2345.40	2345.00	23469.10
	TOTAL COST	4999.90	4599.00	4500.45	4739.00	4489.00	4539.00	4684.70	4600.40	4420.60	4333.60	4355.40	4334.00	54593.05
	SOLD FOR	15090.00	16006.00	17020.90	16023.00	18983.04	21309.50	23120.00	24320.50	25340.50	26200.00	26700.00	28900.90	259044.34
	QUANTITY	34	38	42	40	49	53	56	57	60	68	70	88	555
	REVENUE EA	296.77	300.18	298.11	282.10	295.80	316.42	329.20	345.92	368.67	322.01	319.24	279.17	312.14
	REVENUE	10090.01	11407.00	12529.45	11284.00	14494.04	16770.50	18435.20	19720.10	20919.90	21896.40	22346.60	24566.90	204451.29
	PROFIT	201.8%	248.0%	278.4%	238.1%	322.9%	369.5%	393.6%	428.7%	473.2%	505.3%	513.3%	566.8%	374.5%

With "Spin 'n' Print," you can print a spreadsheet or any text file sideways.

asked to enter the drive name and filename of the ASCII text file you want to print. If you forget the name of the file, enter D as the filename, and Spin 'n' Print will display a directory for you.

Next, select the width and height of the printed characters. The default settings are shown as follows:

CPI 10.29 113.1 CPP (Right) (Left)
LPI 6.00 48.0 LPP (Up) (Down)

CPI = Characters Per Inch
CPP = Characters Per Page
LPI = Lines Per Inch
LPP = Lines Per Page

If you wish to change these settings, use the right- and left-cursor keys to change the CPI, and the up- and down-cursor keys to change the LPI. Your printer normally prints in 10 CPI × 6 LPI, with condensed print at 17 CPI × 6 LPI. You can set the CPI to any number in the range 1–24 and the LPI to any number in the range 1–15. The smallest print, 24 CPI × 15 LPI, prints 120 lines of 264 characters on each 8½ × 11 inch sheet of paper.

Next, you're asked to set up your printer and to press any key when ready. After you've pressed a key, Spin 'n' Print prints your document down the long side of the paper. Lines that are longer than a single sheet of paper are continued on the next sheet.

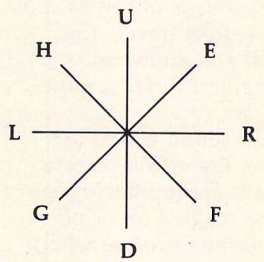
How It Works

If you look at the program (the ASCII file SPIN-.BAS on the accompanying disk), you'll notice that the working part takes up less than 50 lines of code. Data statements are contained in 256 lines; these lines define the 256 characters in a way that makes scaling easy. For example, this is the definition of the capital letter *E:*

```
DATA R6L6D4R4L4D4R6:' E
```

The group of letters and numbers between the word *DATA* and the colon define the letter *E*. This definition is similar to drawing an *E* with BASIC's DRAW statement. Think of placing a pencil on a piece of paper and moving it in the direction and distance specified. The first letter in the definition, *R*, means move right. The second character in the definition specifies the distance to move. Thus, R6 means move the pencil six units to the right (to form the top of the *E*). The next two characters define a movement six units to the left, or back where it started. Next, move down four units (D4), then right four, left four, down four, and right six to complete the *E*.

If the character *B* precedes a direction character, the pencil moves in that direction—but we don't draw. This is useful, for example, in creating the equal sign, which would be BD2R6BD6L6. The characters *Z0* or *Z1* create a dot at the current location for periods, commas, and so on. The characters *P0* indicate a paint fill starting at the current location. Here is a complete list of movements and commands:



B = Move but don't draw
Z0 or Z1 = Draw dot
P0 = Paint

Each character's size is eight units wide by ten units tall. These simple movements are all that is necessary to define all 256 characters. Scaling is now simply a matter of mathematics. All the program has to do is multiply the distance in each character definition by the appropriate scaling factor as it draws. For greater flexibility, I wrote my own draw routine to interpret and draw each character.

After the character is drawn, the bit pattern is read off the screen and saved in array LCHR$ in a form that the printer can print directly. This eliminates the need to draw each character in the character set. Only the characters used in the file are drawn and saved. **PC**

Sentinel Worlds I

James V. Trunzo

Some things just get better and better. Like PC entertainment software, for instance. In the last few years, PCs have grown more and more powerful, with larger memories, enhanced graphics capabilities, and faster processor speeds. Software companies have taken advantage of this added power and pushed game design far beyond previous limits.

Sentinel Worlds I (which was developed by Future Magic but is distributed by Electronic Arts) is an excellent example of a science-fiction role-playing game that redefines the state of the art.

Sights and Sound

Long before you become involved in its exciting and challenging story line, *Sentinel Worlds* will win you over with its superior graphics and sound. The program uses almost every conceivable graphics scheme to produce its visual treats. With close-ups of your crew members' profiles, hi-res alien life forms, detailed overheads of towns and cities, pseudo–3-D street travel, 16-color terrain maps, and animated combat sequences, *Sentinel Worlds* is quite simply a work of art.

The music and sound effects are equally impressive; the sound is realistic, and the music is appropriately high-tech. Either can be toggled on or off. The music *can* become intrusive when you're trying to give orders, monitor communication, and fight off raiders.

Interplanetary Plot

Sentinel Worlds isn't all flash and no substance—the game takes a simple and familiar premise and enhances it with a story within a story. The Caldorre System suddenly finds its trade routes under siege by raiders. The task for you and the four other new cadets who make up your crew is to help stop the attacks on the cargo ships.

On the surface, the objective appears routine. Soon, however, you discover that these mysterious raids might be part of a much larger plot, and you become entangled in a dangerous tale of intrigue. Elements of the Old West (a range war going on between the farmers and rangers on Norjaenn), fantasy (intelligent nonhuman races and magic artifacts), and good old-fashioned mystery make this much more than a simple role-playing game in a science-fiction setting. What separates this game from similar games is the varied story line and intricate puzzle that must be solved to win the game.

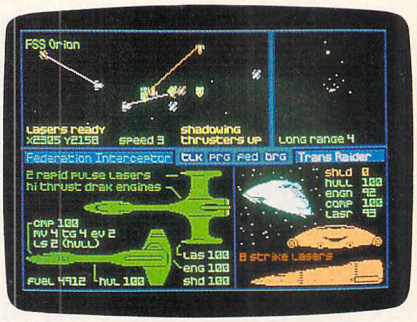
The A-Team

First, you must assemble a crew, which you can build from scratch or from the group that already exists. Each member of the crew has a specific duty (pilot, navigator, communications officer, engineer, medic) and possesses rudimentary skills that can be enhanced through experience and training. When improving skills and observing individual character traits, you'll need to take more care than is required in other role-playing games. You'll find that the program factors these elements into the outcome of various actions and events.

FAST FACTS

Title:	*Sentinel Worlds I*
Category:	Science-fiction role-playing game
Features:	Graphics; challenging scenario; balance between combat and other game elements
Requirements:	IBM PC, XT, AT, PS/2, Tandy, or compatibles; CGA (but EGA or Tandy 16-color recommended); DOS 2.1 (or later version); 256K
Publisher:	Electronic Arts P.O. Box 7578 San Mateo, CA 94403-7578
Price:	$49.95

For example, a crew member with high comprehension and charisma can more easily communicate with other nonplaying characters. Each crew member is a specialist and should be trained accordingly if the crew is to function successfully as a unit. Skills are designated as either Individual or Team skills. The program uses the cumulative ratings of the group to determine the degree of success, if any, when a task calls for a Team skill. I found the interaction among the team members in *Sentinel Worlds* to be more sophisticated than in similar games where characters are only superficially different.



Shadow aliens in Sentinel Worlds I.

Can We Talk?

Because of the strong mystery element in the game, you'll spend much of your time investigating the Caldorre System and talking with the various inhabitants. Communication is handled in a rather unique way: After you've targeted the ship, person, or creature you want to speak to, a menu appears listing the topics you can discuss. After you've selected a topic, the message box displays the dialogue. Depending upon the results, you can continue the conversation, change the topic, or stop the conversation.

Combat, whether ship-to-ship or man-to-man, combines both strategic and tactical elements. Whatever the mode of combat, the computer handles one part of the fighting, while you handle another. For example, during ground combat, you handle the group leader's actions, while the computer takes care of the crew's responses. This sharing of duties works well because it makes the player an integral part of the adventure, at the same time relieving the player of much of the burden of the game.

You can access all of the commands by using the keyboard—many of them with the function keys. You don't really need to make a map, though it would be wise to note your x,y coordinates to make it easier to return to your position. You'll also need to read the User's Manual closely to determine the hows and whys of the game.

Nearly Complete

If *Sentinel Worlds* has a weak link, it's the program's documentation. While nothing major is missing from the manual, it's difficult to find some of the information unless you're familiar with the rules as a whole. The instruction booklet is well illustrated, but the explanations could have been more detailed and more numerous and some additional examples of actual gameplay could have been included.

You'll also receive a booklet with *Sentinel Worlds* that has 88 paragraphs of plot information. (Booklets like this are becoming more and more commonplace.) The program tells you when to use the booklet and which paragraph to read. Try to resist the temptation to read the sections in advance; doing so only spoils the game. In most cases, the paragraphs will make no sense anyway if read out of context.

Sentinel Worlds contains other features that make play more challenging. With an economic element added to the story, you'll find that trading and mining can help you finance the purchase of better equipment. And because it can take a long time to complete the game, *Sentinel Worlds* offers a liberal Game Save feature that you can use any time.

In sum, Future Magic has produced a superior product with its *Sentinel Worlds I*. I only hope the numeral indicates we will soon have more of the same.

File Rescue Plus

John Shadle

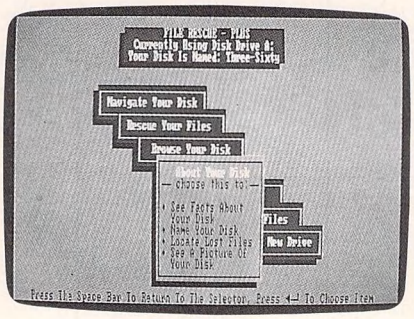
Sooner or later it happens to everyone—you delete a file you want to keep. Murphy's Law is in force at all times, on all computers: The deleted data is probably a file you can't live without.

Then there's the matter of where bad disks go when they die. Many go to the trash, carrying with them hours of work lost on a disk grown weak with age or marred by a stray fingerprint.

What to do? If you've lost a text file, you can consider retyping it—but there goes your weekend. Perhaps you backed it up, but perhaps not—too often, making backups is part of the must-do backlog which never gets done.

Paying for Itself

This is where utilities like *File Rescue Plus* repay their purchase price. They can reclaim nearly all accidentally erased files—provided nothing is subsequently written in the disk space they used. In addition to recovering deleted files, *FRP* can also recover data from damaged disks. While no program can heal damaged data areas, data can often be reclaimed from undamaged areas. The recovery process bypasses damaged data and relinks undamaged data into a new file.


Currently Using Disk Drive A:
Your Disk Is Named: Three-Sixty
Navigate Your Disk
Rescue Your Files
Browse Your Disk
Choose This to:-
See Facts About Your Disk
Name Your Disk
Locate Lost Files
See A Picture Of Your Disk
Files
New Drive
Press The Space Bar To Return To The Selector, Press ↵ To Choose Item

File Rescue Plus *is an easy-to-use DOS utility.*

This feature works best with text files, since missing or garbled parts of the file can be retyped. Unfortunately, executable files (those with .EXE or .COM extensions) won't run unless every bit of data is recovered in its original condition. Attempting to recover only parts of those files is futile.

Like much newer software, *FRP* is written with the documentation in the program instead of in a bulky manual. (An 18-page booklet is also included.) It includes well-written internal Help screens designed to guide you through the sometimes complicated process of recovering a file. When you've become more accustomed to program operation, the extended Help screens can be turned off with a keypress, while leaving intact online Help for any specific command.

To help you diagnose the problem, *FRP* is equipped with substantial disk-testing features. It can test the directory and the File Allocation Table and can test-read all files. Once you've located the source of the problem, it's easier to recover damaged files.

Editor and Optimizer

Those who want to do technical disk work will also find an excellent track-and-sector editor that lets you search an individual file for selected information, change it, and write it back to the disk. It can search the entire disk for either numeric or text data, pinpoint its location on the disk, and discover which file the data belongs to.

FRP is also equipped with a file-optimizing feature not usually found in file-recovery programs. File optimizing is most useful on hard drives, where data can easily become scattered. Optimizing moves file data to adjacent parts of the disk. This speeds up read time, and it makes recovering a deleted file easier. File recovery is most successful when the data is in contiguous disk areas, and *FRP* lists the number of non-contiguous disk areas for each file, which makes it easy to spot files with multiple breaks.

It's important to note that *FRP* optimizes only selected files, not the entire hard drive. Those who have had an unfortunate experience with whole-disk optimizers will appreciate this more limited option. You can optimize the files that need it and leave the others alone.

FRP also provides an option which might prove invaluable wherever confidential material is stored on a shared hard drive. Using undelete features found in *FRP* and similar programs, unauthorized personnel can recover a deleted file containing confidential material. The shredding operation

FAST FACTS

Title:	*File Rescue Plus*
Category:	DOS utility
Features:	Layered menus, expanded Help, and pop-up windows
Requirements:	IBM PC or compatible with a minimum of 256K; color or monochrome monitor (CGA or EGA recommended); DOS 2.0 or higher
Publisher:	Three Sixty 2105 Bascom Ave. Suite 200 Campbell, CA 95008
Price:	$29.95

doesn't stop with deleting a file—it overwrites its data with spaces. In fact, the program can shred all the currently unused data areas to make the recovery of all deleted data impossible.

Another feature lets you change file attributes—the most important of which is the read-only, or lock, attribute. Locking a file makes it impossible to delete it. This provides protection for important files such as database-structure files. Unfortunately—and this is a feature of DOS, not *FRP*—while you can't delete a locked file, you can't write to it, either. Locking isn't for data files.

You may want to use this feature to remove the read-only attribute from files. Some database programs install read-only system files on a hard drive. Then when you upgrade to a new database, you can't delete the old system files. Once *FRP* removes the read-only attribute, the files can be deleted in the usual way.

One feature missing from *FRP* is a way to set screen colors. While the default choice of screen colors is agreeable, you may wish to change them to suit your eyes and system. More serious is the program's inability to sense that it's running on a monochrome system. While *FRP* is readable on some monochrome systems, it's not on others—an unfortunate problem for an otherwise excellent program.

ThinkTank

Neil Randall

Experienced MS-DOS users might well do a double-take at this review: *ThinkTank* is by now over three years old. For those new to the MS-DOS world, however, *ThinkTank* may be unfamiliar. It was to me, for example, and it's too important a package to remain a stranger. I'm a new user, yet this has already become an indispensable program.

ThinkTank is an outline processor. In practical terms, this means it lets you construct outlines for writing. A better name for *ThinkTank*, though, would be a *brainstorming* program. Basically, it lets you jot down thoughts as they occur to you, reorganizing, expanding upon, or reorienting them as you later see fit.

Outlining programs have received considerable flak from those concerned with the whole notion of writing on a computer. Outlines were once taught in all writing courses, and are still taught in many. The problem some have with them is two-fold: First, most outlines are constructed only *after* the document is written (which makes them useless); second, real writing does not proceed from the organized, hierarchical structure that the outline represents. Why, then, the argument goes, should outlining programs be any better?

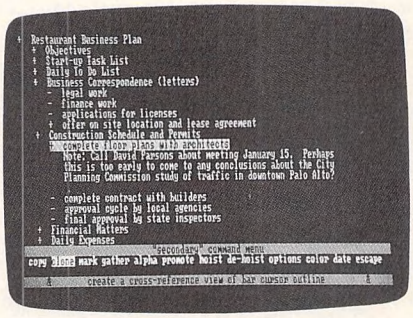
Prose and Processes

ThinkTank answers this question by making the outlining process part of the writing process. The program encourages, for example, the writing of individual, small documents at every stage in the outline. It encourages, also, the constant rearranging of headings, subheadings, and associated documents, with the final goal—not the initial goal—being a fully organized, ultimately useful document.

ThinkTank encourages these things in a number of ways. First, it makes reorganizing easy, with commands for moving headings anywhere in the document (even subordinating them to other headings). Second, it includes a word processor with enough features to allow real usage, real writing. Third, it does not number the headings on the screen. By not numbering the headings, *ThinkTank* insists that none of the outline's order is carved in stone. Outliners that use the traditional hierarchy of numbers and letters—beginning with uppercase Roman numerals and ending with parenthetical Arabic numbers—actually convince the user not to change things around. With *ThinkTank*, the initial goal is the gathering of ideas from which the finished written product will flow.

Not numbering has another advantage, this one a surprising one. Graphically, *ThinkTank* is at first disappointing. It consists of a blank screen with a command menu at the bottom, and every entry begins with either a minus sign (−) or a plus sign (+). Minus signs are headings that contain no subheadings, while plus signs signify at least one level of subheadings.

Hardly stunning, it seems. But here, too, *ThinkTank* encourages brainstorming. What the screen looks like, after all, is simply a scratch pad, precisely the kind of thing we normally use for random jottings. The effect is to encourage changes, deletions, and constant revision. In other words, it encourages free thinking.


+ Restaurant Business Plan
+ Objectives
+ Start-up Task List
+ Daily To Do List
+ Business Correspondence (letters)
- legal work
- finance work
- applications for licenses
+ after on site location and lease agreement
+ Construction Schedule and Permits
+ complete floor plans with architects
Note: Call David Parsons about meeting January 15. Perhaps this is too early to come to any conclusions about the City Planning Commission study of traffic in downtown Palo Alto?
- complete contract with builders
- approval cycle by local agencies
- final approval by state inspectors
+ Financial Matters
+ Daily Expenses
"secondary" command menu
copy clone mark gather alpha promote hoist de-hoist options color date escape
create a cross-reference view of the cursor outline

ThinkTank's *screen is simple and streamlined.*

The workings of the program itself are quite easy. You begin with the Home headline; by using the Edit command you can make it the title of your overall outline. Then you hit the Insert key, which drops the cursor line down one and indents it. Here you start listing topics. At the end of each topic, you press the Return key, which brings the cursor line directly below that entry. Pressing the right-arrow key indents the new entry (subordinates it) while left-arrow outdents it (raises it one level). At any time, the Edit command allows you to change the headline itself or to create or edit a document attached to the headline.

Structured Collapse

If your outline takes up too much of the screen, you can collapse the headlines you aren't currently using. If one headline has four subheadlines, each with its own series of subheadlines and associated documents, you simply put the cursor on the top-level headline and press the minus key on the numeric keypad. This removes everything but the top-level headline from the screen. Pressing the plus key brings everything back.

There's much more. You can move headlines from place to place, indenting or outdenting them as you wish. You can search for and mark (for later col-

lection) specified text strings, and you can move from outline to outline with the well-designed save feature. A particularly powerful feature is Cloning, which lets you make a dynamic copy of a particular headline. The difference between Cloning and Copying is that the cloned headline will change whenever you change the original, even if it's not currently on the screen. And the Alpha command alphabetizes a headline's subheadings.

FAST FACTS

Title:	*ThinkTank*
Category:	Outline processor
Features:	Large capacity, ease of use, flexibility of application
Requirements:	IBM PC, XT, AT, PS/2, and 100-percent compatibles; 256K; 5¼" drive; monochrome or color display
Publisher:	Symantec/Living Videotext 117 Easy St. Mountain View, CA 94043
Price:	$195

The Port command controls the output and input features. From here you print your outlines or save them as text files to be used in a separate word processor. Port will also create a compact "structured" file, which you can print from DOS or use to transfer data from one outline to another. Port's formatting options include margin settings, number of headlines printed, number of internal documents printed, numbering complexity, and header and footer information. In the case of long outlines, you will want Port to create a table of contents. One particularly useful feature is that Port will print only the headline (and associated subheadlines) that the cursor is currently on. This means easy printing of portions of the outline.

Huge Capacity

The document editor is itself a usable word processor. Complete with cut-and-paste and search-and-replace functions, it contains enough features to discourage leaving *ThinkTank* for a dedicated word processor. Its value within *ThinkTank* is enormous; every headline and subheadline can support a document of 20,000 characters, up to a total of 32,767 lines of text (about 1500 double-spaced pages) for the entire outline. Because you can write text as you brainstorm, many documents will practically create themselves.

ThinkTank's manuals include a very useful application for the program, one that demonstrates how powerful this package can be. Basically, it suggests setting up a to-do list and then using *ThinkTank*'s features to work your way through it. The idea sounds simplistic, but I have reached a point where I use it constantly. For those with a number of different things to do, it can be a godsend.

How Neil Did It

Here's what I did. One Sunday evening, I started a new outline and entered (all on the same level) a series of things I had to complete. I included everything from proposing a new committee at work to writing this review. Then, as I thought of them, I added additional ideas to each of these headlines. Before an hour was out, I had brainstormed everything I could think of, without thinking too hard, about these various items.

The value of the exercise became apparent the next morning. I booted up *ThinkTank* and the outline loaded automatically. I simply began working through the list, in no particular order. Within some headlines, I created documents to write letters, usually after more brainstorming, more jotting down of ideas. Then I printed out the letter (sometimes porting to a word processor for fancying up) and, when applicable, deleted the whole headline. (Instead of deleting it, I could have marked it for gathering at the end of the day, thereby reviewing what I'd done that day.) By the end of the day, in fact, I'd done quite a bit. Some of the to-do items are still on the list, but the list is changing constantly.

I'd never really believed that a computer could help you organize your life. Too often, I've found that they distract and complicate, rather than concentrate and simplify. *ThinkTank* is the first program that has actually worked for me in organizing my life, and because of that I now find it indispensable. I recommend it without reservation.

Flight Simulator 3.0

Ervin Bobo

When a company comes out with a new version of a program, it's usually no big deal. There's probably been a little debugging, a bit of fine-tuning, and a few minor improvements.

Not so with Microsoft's newest version of *Flight Simulator*—version 3.0. This program has had so many dramatic changes made to it that Microsoft would have been justified in giving it an entirely new name.

Blast from the Past

For several years, *Flight Simulator* has provided a realistic simulation of flying a light aircraft, complete with detailed takeoffs and landings, cross-country navigation, Visual Flight Rule (VFR) and Instrument Flight Rule (IFR) flight options, and the chance for those tired of everyday reality to fly a World War I aircraft in combat.

With limited space and so many changes to describe, I'll have to assume you're familiar with the conventions of earlier versions. *Flight Simulator* 3.0 *(FS3)* builds on these conventions with improved graphics, the addition of a Gates Learjet, and changes in the user interface. The sound is still the same putt-putt noise of earlier versions (even when you're flying the jet), but we'll lay the blame for that at the feet of IBM: It's a limitation of the computer rather than the software.

New Graphics

As far as graphics go, the old wire-frame outlines of buildings and other objects are gone, replaced by solid 3-D objects. (For a taste of the past, you can toggle in wire frames to increase the frame rate and give the impression of greater speed.) When you first take off from Meigs Airport in Chicago—still the default airport—you'll notice that there are more buildings than in

previous versions.

The programmers have struck a balance between the sparse scenery of the original and the dense scenery of the accessory Star Scenic Disks. The result is "densely populated corridors of interest"—meaning you'll find no landmarks when you're flying over the countryside, but you'll see more landmarks than before when you're near an operating area.

Pull down the Environment menu and you can add ground detail in the form of dots, small squares, or large squares. The three choices have varying effects on the frame rate.

Ground detail gives the illusion of a measurable terrain moving beneath you, adding to the feeling of movement. Change the time clock to reflect night flying and you'll find the sky filled with stars and the ground filled with city lights. Those with some knowledge of astronomy will find that the program accurately places the constellations.

Take Control

When you choose the Gates Learjet, the control panel changes to reflect the higher speeds—up to about Mach .80. To make the plane easier to fly, the two engines of the Learjet are treated as one engine. You'll find the controls more sensitive in this mode, reflecting the differences in flying a fast jet and a slow piston aircraft. To compensate for the difference in aircraft, you can adjust the sensitivity of the joystick or mouse.

The World War I Ace game is still here, with its anachronistic radar, but you'll also find a few new games. Crop Dusting challenges you to lay down a pattern of insecticide, but only on the designated field. In Formation Flying, you try to follow another aircraft around obstacles like the TransAmerica Building and the Golden Gate Bridge, with a smoke trail helping you to spot the lead plane. The Multi-Player mode allows you to connect two computers either directly or by modem so that you and a friend can share airspace.

For more conscientious flyers, *FS3* has added a Flight Instruction mode, in which the craft flies through one of ten lessons and uses a message bar to explain what's being done. Flight Analysis analyzes your technique in landing, plotting a course, or maneuvering, and shows you the results in the form of a graph. Flight Recorder and Instant Replay allow you to take a second look at about ten seconds of flight, letting you make your own analysis.

FAST FACTS

Title:	*Flight Simulator* 3.0
Category:	Flight simulator
Features:	Choice of three aircraft; multiple views; new user interface; Flight Instruction mode; flight games; Multi-Player mode; supports EGA graphics
Requirements:	IBM, Tandy, or compatible PC; 256K (some features require additional memory); disk drive; graphics adapter; hard disk needed for new game options
Publisher:	Microsoft 16011 NE 36th Way Redmond, WA 98073
Price:	$49.95

Heads Up

Another remarkable feature is the EFIS/CFPD routine. Described as "the future of aircraft control," the EFIS (Electronic Flight Instrumentation System) used here is a CFPD (Command Path Flight Display). It projects a heads-up display on your windscreen, with a series of hollow rectangles moving toward you. If you manage to keep your craft centered in the rectangles, you'll find yourself completing a perfect landing at Chicago's O'Hare Airport.

While there have always been multiple views in *Flight Simulator*, they were all from the viewpoint of the pilot. Borrowing techniques first used in *JET*, *FS3* now provides you with views from the control tower, a tracking camera, or a spotter plane. Zoom controls work with all these modes to give you a closer look, and you can place the spotter plane almost anywhere in relation to your own craft.

Menus

A menu-based interface lets you access all the new features. By pressing keys 1–5 (on the main keyboard, not on the numeric keypad), you can select the menu titles above the top border of the aircraft windscreen. A selection causes a drop-down menu and, depending on the choice, a second or third menu to appear.

With the menus, you'll control such things as time of day, weather, cloud cover, aircraft choice, geographic location, time of year, realism and reliability levels, and much more. After I'd selected thunderstorms for a flight over Lake Michigan, I was pleased to see lightning appearing within the clouds and striking the ground.

FS3 also uses a windowing environment. It's possible to devote the major portion of your monitor to the out-the-cockpit view, while a smaller portion shows a control-tower view of your plane, a map of the area in which you're flying, or one of several other views.

The startup menus take care of the nuts and bolts of *FS3*, including the type of monitor, the type of keyboard, and whether you wish to use mouse control. Your choices are saved to disk and automatically accessed each time you boot the program.

Super Video

The program provides about 16 choices in monitors and resolutions, including EGA. When I first saw *FS3* on an EGA monitor, I finally decided to buy an EGA for my computer. With the EGA's 16 colors and higher resolution, the program now compares visually to *Flight Simulator II* on the Amiga.

The people at SubLOGIC (who created the program for Microsoft) mumbled something unintelligible when I suggested that *FS3* owes a lot to the Amiga version. I think anyone familiar with both will see the similarities, but it's also fair to say that *FS3* has gone beyond the Amiga version.

One major difference is that *FS3* represents a giant step in the direction of modular design: Rather than being in one piece, as in previous versions, 3.0 is made up of modules. Any module can be changed, corrected, or improved without affecting the others. One immediate benefit is the possible addition of other aircraft through accessory disks (this explains the Aircraft Li-

brary entry on the Mode menu).

Though I don't like to speculate on future products, the modular approach could pave the way for a new flight interface, to which SubLOGIC seems firmly committed: a control yoke and rudder pedals with physical feedback. In its finest form, you'd feel the yoke shudder as you trundled down the runway and feel the force of air on your ailerons as you banked into a turn.

Fly a Gates Learjet in Flight Simulator *3.0.*

Like the earlier *Flight Simulator* programs, *FS3* offers documentation that leaves no stone unturned. The explanations are clear, concise, and properly redundant. Reading it is almost like going through ground school.

Take in the Scenery

The program is also compatible with the SubLOGIC Scenery Disks, which increase your flying area, adding new cities and new airports. The scenery of *FS3*, in fact, is comparable in quality to the scenery on the Star Scenic Disks.

This version's loading sequence for scenery disks is somewhat different from the one used in the previous versions of the program. With a dual-floppy system, you load and run the program from drive B and insert the scenery disk in drive A. To log in the scenery disk, press Shift-E (not Ctrl-E, as in the previous version). If you have a hard disk, simply put the scenery disk in drive A to load it.

Another improvement in *FS3* is that the crash detection—which can be toggled on or off, depending on whether you wish to be bothered by the consequences of your mistakes—will now work with the scenery disks. If you make a mistake while flying under the London Bridge (on the new Western Europe Scenic Disk), you'll know it.

FS3 requires 256K, a graphics card, and a single disk drive. You can use a joystick, mouse, or Maxx control yoke, or fly the program entirely from the keyboard. Because the program is on two disks, you'll want to give serious thought to installing it on a hard drive. Unless the program's on a hard drive, you won't be able to play the new game options.

On balance, Microsoft has provided us with an excellent new version of what is probably the best-selling non-business program in the history of computing. Though *Flight Simulator* would still have continued to sell well, the changes bring it up-to-date with the new ways we equip our computers (lots of memory, enhanced monitors, hard drives) and the new ways we use them (logical user interfacing, drop-down menus, mouse control). As a result, *Flight Simulator* 3.0 should quickly secure a place for itself on the best-seller charts and a place in the history of computing.

Deluxe Paint II

John Foust

Nothing shows off a PC like a dazzling, multicolored picture on the screen. If you've seen these beautifully detailed electronic paintings in computer showrooms and magazines, you may have wondered what it takes to create images like this.

Like any art form, electronic painting takes talent, but you also need the right tools. *Deluxe Paint II*, from Electronic Arts, provides all the tools you need to make your own images for presentations, for fun, or just for showing off what your PC can do.

Video Paint Set

Getting started with *Deluxe Paint II* couldn't be easier. The package comes with both 3½- and 5¼-inch disks and installs in a flash. If you have a hard disk, a simple batch file copies the necessary files to a directory named DPAINT2.

Deluxe Paint works with any PC display except the oldest monochrome text-only video board. Most present-day monochrome video boards include Hercules compatibility, which offers a high-resolution black-and-white mode.

The type of video board you have determines your resolution and colors. With CGA, *Deluxe Paint* can use up to four colors. With a VGA display, like that found in the IBM PS/2 series, the program can use as many as 256 colors in one picture, with stunning results.

The manual makes getting started easy. It's spiral-bound, so it lays flat for easy beside-the-computer viewing. There are plenty of tutorials and pictures to help you get started. Many examples in the manual correspond to the images supplied on disk. The manual also contains detailed explanations of the differences and limitations you'll encounter with various video boards.

Easy Interface

Deluxe Paint II has a well-integrated user interface. The IBM version speaks a unified Esperanto of window-and-mouse dialects, resembling at once the Macintosh, Windows, and the Amiga. If you're familiar with any of these, you shouldn't have any problem navigating the program.

The easiest way to get to know the program is by drawing something. A bar of icons along the right side of the screen displays most of the drawing functions—lines, curves, spray paint, fills, boxes, and circles. You can choose your colors from a palette at the bottom of the icon bar. Less frequently used functions are selected from menus or keyboard shortcuts.

But you're not limited to drawing. You can enter text to title your images, too. You may choose from 21 fonts in several sizes. Macintosh and Amiga users will be familiar with many of the font names, such as Naples, Stencil, and Art Deco.

Deluxe Features

Deluxe Paint goes beyond the features found in most paint programs, particularly when it comes to brushes. Any portion of an image can be clipped out as a brush. Brushes can be sheared, rotated to any degree, used as brushes for the regular drawing modes, and changed

to solid color for making drop shadows.

Apart from the standard two-dimensional brush rotation, in *Deluxe Paint II*, brushes can appear to be rotated in 3-D space. For example, you could clip brushes of letters made with the text function and then rotate them in space so they appeared to be on the sides of a cube. Called *perspective mapping*, this technique lends extra dimensionality to otherwise flat pictures.

Deluxe Paint II *offers powerful painting tools.*

An option called antialiasing can be used with perspective mapping to produce even more realistic results. When a sharp diagonal line of color is drawn on the screen, a distracting stair-step pattern is often visible. With antialiasing, the stair steps of a blue line on a white background are filled in with lighter blues, giving a smooth transition instead of sharp steps.

Paint by Number

Another useful feature is locked backgrounds. To experiment with a picture, you can lock it. Once locked, the background of the painting cannot be disturbed. Changes will not affect the background, and they can be cleared away quickly. As the changes become acceptable, they, too, can be added to the locked background. In this way, a painting can be built slowly, from back to front, similar to the way in which traditional painters work.

With stencils, just certain colors in the picture can be locked. These colors are not affected by paint. You can use this technique to paint "behind" certain colors. Anything you draw appears behind any objects in the locked colors. Layered painting effects are easily performed with stencils and locked backgrounds.

Another feature is called color cycling. This is an automated way of rotating ranges of colors in the color palette. Color cycling can be used to paint with rainbow paint. With the help of a few tricks, color cycling can produce simple animated pictures. This technique is explained in a tutorial with example pictures from the disk. One picture animates a bouncing ball; another shows a theater marquee with blinking lights.

Other options can set grid snap—so your movements are locked to traveling on a grid of a certain size—or display the coordinates of your current position. There is also an undo function that can take back your last action.

Moving Pictures

The pictures may be great, but how do you get them out of the computer? *Deluxe Paint* can print pictures, too. More than 30 printers are supported, including the latest color printers such as the Hewlett-Packard PaintJet and the Xerox 4020.

Printing a color image on a black-and-white printer means colors will be approximated with gray scales. The default printing settings give good results, but you can tinker with the knobs and dials in the print function to get even better printouts.

Deluxe Paint uses its own file format for storing images. Its files are given the extension .LBM, for interleaved bitmap. These files are compatible with Amiga IFF pictures but aren't directly compatible with other PC formats such as *PC Paintbrush.*

In order to use pictures from other PC paint programs, or to use *Deluxe Paint* pictures in other paint or publishing programs, you must use a separate conversion program to change the files to *Deluxe Paint* format.

The conversion program only runs under DOS's command-line interface. To convert a *MacPaint* image to *Deluxe Paint*, you enter CONVERT -M MACPIC .MAC -D MACPIC.LBM. Other formats are selected with different options such as -P1.

This system may prove too cryptic for some users. Furthermore, the program doesn't reliably convert images from some formats, including *MacPaint.* The pictures become a scrambled mess, like a television picture influenced by a nearby hair dryer.

Other Aspects

A memory-resident program called Camera can capture graphics screens from other programs. This provides another way to get images into *Deluxe Paint* format. Again, Camera requires command-line options to select screen format and hot-key sequences.

Moving images between programs can be a tricky proposition. Beyond elementary conflicts with file formats, you may have to work around differences in aspect ratio. Depending on the video resolution mode you choose to work in, any given dot on the screen can look square, tall, or wide.

For example, if you're working on a picture in EGA 640 dot × 350 dot mode and load a brush that was made with the CGA 320 × 200 mode, the image will look squished. Sometimes doubling or halving the brush can correct the problem, but not completely. The aspect-ratio problem can be corrected completely on printing by changing the default output sizes, but this requires a sophisticated understanding of the differences in height and width of the image in question.

Deluxe Paint II is a wonderful program. Its painting tools and features are way ahead of the pack. It adapts well to any computer system and will expand when you improve and expand your system.

FAST FACTS

Title:	*Deluxe Paint II*
Category:	Paint program
Features:	Brush commands, perspective, color cycling, shading and smearing, antialiasing
Requirements:	IBM PC, Tandy, or compatible with 640K; a Microsoft-compatible mouse; and a Hercules, CGA, Tandy, EGA, or VGA display
Publisher:	Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404
Price:	$99.95

John Elway's Quarterback

Mickey McLean

In *John Elway's Quarterback*, PC meets gridiron, and armchair quarterbacks everywhere gain a little yardage. Based on the popular coin-operated arcade game of the same name, *John Elway's Quarterback* lets you play quarterback on offense and middle linebacker on defense. You get to call and execute the plays, and, best of all, you'll never even have to break a sweat.

What you'll need is timing, skill, and luck. This game is not statistically based, so you'll need quick reflexes to move the ball on offense and you'll need to be in the right place at the right time to stop your opponent on defense.

Kickoff

When you start the game, you have the option of playing against a computer opponent or another person. You can also choose game speed (a scale of 1–9, with 1 being fastest) and your professional football team.

You make your selections in the game's locker room, and it's a good idea to note whether you're the blue or red team (denoted by the color of the helmet in front of your locker)—you won't get a chance to double-check before the game starts. The game starts without warning. If you react slowly and don't kick off soon enough, the computer will take over and kick the ball poorly for you. This gives your opponent excellent field position to start the game.

Once you gain possession of the ball, you become coach and quarterback. You can choose between three running and six passing plays that can be run either to the left or right. You can pass or run from any formation, but your computer teammates react according to the called play. For example, in a run formation, receivers tend to stay in close and assist the linemen in blocking the defense, leaving them out of position to catch the ball downfield for a big gain.

Execution Is the Key

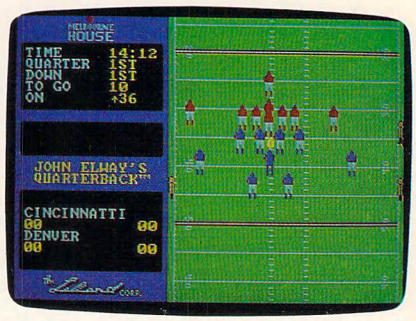
After you've entered the play, you have to execute it properly. When you run the ball, the quarterback takes the snap from center and has to follow his blockers (there are no hand-offs in this game). You determine where the quarterback goes by studying the diagrams in the Player's Manual or by looking at the diagramed plays on the play-selection screen.

The play diagrams also show your receivers' pass patterns. To pass the ball, you fade your computer quarterback into the pocket and then hold down the space bar or press the fire button on your joystick. A yellow arrow appears on the screen that you move downfield with the cursor keys or joystick. You have to act quickly to pick out an open receiver and align the arrow with him before the defense sacks you for a loss of yardage. Once you spot your receiver, you release the space bar or fire button to send the ball spiraling downfield.

FAST FACTS

Title:	*John Elway's Quarterback*
Category:	Football arcade game
Features:	One- and two-player options; joystick or keyboard interface; choice of offensive and defensive plays
Requirements:	IBM PC or true compatible; Hercules, CGA, EGA, or MCGA graphics card; 256K; 5¼-inch disk drive (3½-inch disk available to program owners for $3.00)
Publisher:	Melbourne House 711 West 17th St., #G9 Costa Mesa, CA 92627
Price:	$29.99

When the receiver catches the ball, his jersey and pants become the same color. This makes it easy to tell who has received the ball and which player you control with the keyboard or joystick. If you miss your receiver and accidentally throw the ball toward an opponent's player, the game pauses briefly to inform you that the pass has been intercepted. The defensive player's uniform then changes color and controls the ball.



Play quarterback or middle linebacker.

A tipped pass provides another exciting possibility in *Quarterback*. A passed ball can bounce off the receiver's hands and into a teammate's or opponent's grasp.

One advantage *Quarterback* has over other computer football games is a choice of receivers on any play. Most football games require you to designate a receiver before the snap, which limits your options.

Defense! Defense!

The offense gets all the glory, but it takes a good defense to win championships. In *Quarterback*, you control the middle linebacker and have six defensive formations from which to choose. A goal-line formation is designed to stop the run, while a zone or prevent defense is intended to stop passing plays.

Your defensive control player can rush the passer or drop back into pass coverage. If you decide to rush and your opponent's quarterback completes the pass downfield, you'll have to rely on your computer teammates to stop him. Unlike other football games, *Quarterback* doesn't change your defensive control player to a defender closer to the ball carrier.

Get Your Kicks In

Just as in real football, the kicking game can determine who wins and who loses. *Quarterback* adds to the game's realism by including a wind factor on kickoffs, punts, field goals, and extra points. A flag denoting wind direction appears on the play-selection screen and during the lineup for the kick.

A kick is performed like a pass: You must place the arrow at the right distance and in the correct direction. The only option not available to the

kicking team is a fake; once a kick has been selected, it has to be carried out. On kickoffs, however, you can attempt an onside kick by kicking the ball short and beating your opponent to the ball. One unrealistic aspect of the kicking game is the ability to kick excessively long field goals. The computer team once kicked a 71-yarder.

Player movement in the game is excellent, and Melbourne House has added one of the most realistic visual elements of a professional football game: spiking the ball after a touchdown.

Just to keep you honest, the program keeps track of your statistics during each game. Your performance determines your annual salary, which the computer uses when ranking you against other players.

Timeout

The game does have one important strategic drawback. You can't call a timeout at any time during the game, although you can pause the action. The program does stop the clock if your opponent takes an excessively long time to call a play. Also, you don't need to worry if it's late in the game and you're trailing and need time to catch up. The program senses this and calls a timeout for you in the final two minutes in addition to giving the traditional two-minute-warning timeout.

While *Quarterback* won't win any awards for its sound effects (sound consists of a redundant *Ready, Set, Hut-Hut-Hut-Hut* each time the ball is snapped and an indescribable grunt on each tackle), graphics on the IBM PC version (with an EGA graphics card and monitor) are on a par with the original arcade version.

Quarterback is a good sports game, but it has some grammatical and spelling errors. The game designers should note that *Cincinnati* is not spelled with two *t*'s and, when a field goal or extra point is made, *it's good* is correct, not *its good.*

These problems aside, *John Elway's Quarterback* is an entertaining and challenging game. When the only way to move the ball is through the air, the temptation to throw the long bomb always reminds you why the game designers named the game after quarterback John Elway.

Falcon AT

Ervin Bobo

You don't need an AT to run *Falcon AT,* but it sure helps. While you'll find several improvements in this award-winning simulation, the specialized nature of the AT version means that many computer users won't be able to run the program.

As the name implies, Spectrum HoloByte designed *Falcon AT* for the PC AT and suitable clones. The simulation requires 512K of memory as well as an EGA or VGA monitor, and it's supplied on both 1.2MB 5¼-inch disks and 720K 3½-inch disks. Of the three AT criteria, you can only circumvent one: Within 60 days of purchase, you can exchange the 3½-inch disks for 360K 5¼-inch disks, allowing you to run the simulation on a suitably equipped PC or XT.

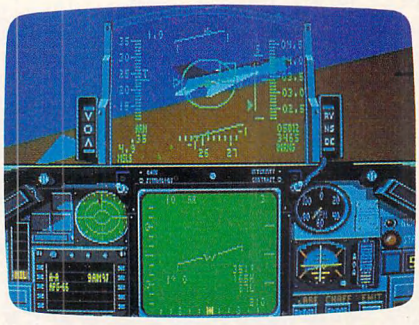
A word of caution: Unless your non-AT computer has a turbo mode, you may be disappointed with *Falcon AT.* At a clock speed of 4.77 MHz, the simulation is slow enough to quickly become boring.

Aerial View

Assuming your computer and monitor are right for the job, you're in for several treats. The first and most obvious one is the color available from your EGA or VGA monitor. With the variety of colors, the control panel of *Falcon AT* is much easier to read and less cluttered than in the previous version.

Because of the EGA and the higher memory requirements, the ground detail is greatly improved. The barracks near the end of the runway look like real (though old) military barracks, complete with windows and a door. Previously, you had to settle for a box. Cities are presented in a pattern of colors that resembles a crazy quilt—an effect that is quite striking. While the cities never take on three dimensions, even at treetop level, legitimate targets such as aircraft hangars do. Both the quality and quantity of the 3-D objects have improved in this new version.

There are now multiple views from outside the aircraft, bringing *Falcon AT* up to the standards set by other flight simulators. With the number keys, you can toggle in views from the control tower, a tracking camera, or a chase plane. There's also an Enemy View, in which you should see what your enemy sees. I never saw anything but a blank sky, even though the numbers at the bottom of the screen faithfully click off the range and speed. The same was true for the Missile-Eye view. (Since these views are undocumented and mentioned only on the quick-reference card, I couldn't determine if they were working as they should.)



You've sighted an enemy MiG in Falcon AT.

Mission Achievable

It's not that I couldn't hit anything. In less than a week I scored 25 kills on MiGs, and this is a far cry from the original *Falcon,* in which I never even saw a MiG. The real credit for my greatly improved skills goes to the revised Autopilot feature. Previously, this seemed to do no more than keep your craft flying straight and level. Now when you engage the autopilot, your craft careens across the sky in search of the nearest MiG. All the maneuvers of the ensuing dogfight are performed automatically—all that's left for you to do is wait for a lock-on and fire the appropriate air-to-air missile. Though there's no distinction in becoming an ace using this feature, it sure beats the heck out of scoring goose eggs each time out.

Missions begin at your air base, located in the southeast corner of the *Falcon AT* world. Toggle from console radar to the chart mode, and you'll see your airbase as well as a flashing cursor indicating the position of your craft. After going through your startup procedures, you roll down the runway. Be-

cause the F-16 is both quick and agile, it doesn't take long to reach takeoff speed, and the joystick requires only a gentle touch to lift you off the ground.

The landscape in the original *Falcon* was limited, so the programmers had to simulate the feeling of speed with a clever device: the rapid updating of the numbers in the HUD (Heads Up Display). If the altimeter numbers changed rapidly, you could believe you were in a fast climb (or dive), even with the slow frame rate. This same device is used in *Falcon AT*, but now the more detailed scenery is updated much faster by the screen.

There's one exception. When you throw the F-16 into any degree of turn, you'll find the compass heading updates so slowly that you'll wonder if you're really flying. Not only does this diminish the feeling of speed, but it makes it difficult to maneuver in a dogfight or a bombing run, and all but impossible to line up a runway approach.

I first thought I had made a mistake by running *Falcon AT* on an XT clone, even though the clone has a turbo mode. This now seems unlikely, since the compass updates as fast as it should when I switch to autopilot. (To line up a landing approach or a bomb run, it's possible to engage the autopilot until you have the necessary heading and then quickly disengage and take over the flying of the final approach. This is not a real solution—only a temporary fix.)

Flying Menus

At the beginning of the program, you choose whether to fly by joystick or keyboard. The keyboard uses the keypad in the sequence made standard by Microsoft's *Flight Simulator*. At its default setting, the keyboard is less sensitive than the joystick, but you can increase or decrease the sensitivity as needed. You can also set the program to work with the Innovation SSI 2001 Sound Board. I was unable to check this feature, but almost anything is an improvement over the standard PC sound.

From another menu, you select the rank at which you wish to fly, with higher ranks increasing the difficulty of the mission. The level of difficulty includes not only the opposition in the form of surface-to-air missiles, but also enhancements to the flight envelope of the F-16. At the higher levels, your computer will more closely emulate the flight characteristics of an F-16. After selecting your rank, you choose one of a dozen missions, where your targets include MiGs, SAM sites, bridges, and enemy barracks. You can also choose the number of MiGs in the air at any one time.

To complete a mission, you must destroy the objective and make a successful landing at your home base. Failure to complete either task results in an incomplete mission. While you may get a small score for destroying things other than your objective, you won't get enough points for a medal.

FAST FACTS

Title:	*Falcon AT*
Category:	Flight simulator
Features:	Multiple views; improved ground detail; fast frame rate; supports EGA colors
Requirements:	IBM AT or compatible recommended; 512K; EGA or VGA graphics adapter
Publisher:	Spectrum HoloByte 2061 Challenger Dr. Alameda, CA 94501
Price:	$59.95

Three-Point Landing

The documentation for *Falcon AT* is well written and complete. You'll find the missions described in detail, with interesting sections relating to the performance of the F-16 and air-combat maneuvers. A quick-reference card makes it somewhat easier to remember the keyboard assignments.

Falcon AT's strengths include its use of color, 3-D objects, and rapid frame rate—the latter applying both to the HUD and to ground objects. All are a direct result of fine-tuning the program for the PC AT and EGA monitor. The weaknesses I found are the slow movement of the compass-heading indicator and the apparent failure of the enemy and missile views. These are major points that should be corrected. If they are, *Falcon AT* could win as many awards as *Falcon* has.

WordStar Professional, Release 5.0

Bob Gingher

WordStar is back. Once the undisputed number 1 word processor, *WordStar* 3.3 became so outdated that most people used it only because it was too much trouble to change to something else. The first real glimmer of change came when MicroPro appointed a new CEO. Then MicroPro finally announced *WordStar* 4.0, which put *WordStar* back in the running. Now there's *WordStar* 5.0, with a page preview that has its competitors scrambling to catch up.

WordStar 5.0's many new features include the choice of the original interface or new pull-down menus, automatic text alignment, advanced page preview (single, multiple thumbnail, or zoom), windows for split-screen editing, footnotes and endnotes (up to 16K for each annotation or comment), newspaper-style columns, faster search-and-replace functions, index and table-of-contents generation, spelling and thesaurus assistance, and support for PostScript- and HP-compatible laser printers.

If you combine the features with MicroPro's excellent customer service (which has come a long way since the

FREE CATALOG
PUBLIC DOMAIN/
SHAREWARE

***Over 500 IBM PC & compatibles disks**
***125 Atari ST disks.**

PC disks as low as $1.25 each, ST as low as $1.60 each! (3½" also) Rent or buy. Free shipping over $20! Call toll free, write or circle reader service for FREE BIG CATALOGUE with full descriptions. Please specify computer—48 hr. turnaround!

SUPER SPECIALS!
BEST GAMES—5 DISKS CRAMMED FULL $16. BEST UTILITIES—5 DISKS JAM-PACKED $16. BUSINESS PAK—EVERYTHING YOU NEED! 5 DISKS $16.

COMPUTER SOLUTIONS, NW
P.O. Box 446, Dept. CPC
Benzonia, MI 49616
1-800-327-2540 (M–F 10–6 EST)
1-616-325-2540

days of *WordStar* 3.3), you get a word processing system worth writing home about and clearly worth the upgrade for millions of users of the old *WordStar*.

A True View

In its early days, writers liked *WordStar* for its what-you-see-is-what-you-get (WYSIWYG) display, which was always one step ahead of the competition. Unlike the display in *Perfect Writer*, my first word processor, the *WordStar* screen provided some sense of how the printed page would actually look. Now *WordStar* 5.0 goes even further by treating WYSIWYG as a sacrament. *WordStar* 5.0's advanced-page-preview feature displays boldface, underlines, and italics (or combinations of all three) just as they'll appear on the printed page.

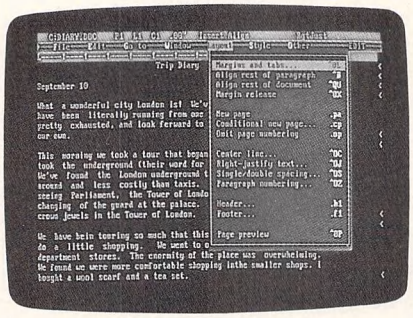
Page preview is a handy feature for checking the overall look of a document—one that *WordStar*'s competitors have quickly tried to emulate. (Microsoft now offers a $49 add-on for *Word* users, and there's a new page-preview feature in *WordPerfect* 5.0.) My own monochrome monitor shows as many as ten thumbnail pages, a VGA-type monitor will exhibit up to 33 pages simultaneously, and a Cornerstone Vista 1600 monitor will show a maximum of 144 pages. Page preview reveals, prior to printing, the faulty placement of headers, footnotes, and page numbers, as well as the general layout of the spacing, margins, and text orientation.

Dots Entertainment

Loyal *WordStar* users should note that many of the familiar dot commands still apply, though there are also many new commands. The .ma command, for example, enables you to perform calculations while merge printing. You can total the dollar amounts of a customer's purchases and show a different total for each customer. Another dot command lets your master document reformat during merge printing so that, for example, the length of the lines changes to incorporate the variable length of names and addresses.

Dot commands have also grown more sophisticated. With them, you can specify both the number of columns and the gutter width between them. While working in one file, you can now choose not only to write to another file, but also to append text to another file without overwriting it. There's also a true print pause.

Merge printing includes many of the options available in *WordStar 2000* and is now far more sophisticated than in earlier versions of *WordStar*. Conditional and end-of-condition dot commands now provide a greater range of printing when you're using selective criteria.



WordStar *5.0 features pull-down menus.*

Help for Tired Fingers

Triggered by the F1 key, the expanded help screen is context-sensitive and presents dot commands alphabetically. It's not as comprehensive as the help screen for *WordStar 2000*, but with the well-organized 500-odd-page documentation from MicroPro, the training guide, on-screen tutors, and pocket *WordStar*, it seems adequate by today's standards.

In addition, MicroPro includes overlays, those high-tech doilies that usually slip off the keyboard. (I never put much stock in them.) Add the README program, which displays a table of contents where you can choose topics to print (and read), and you have a very flexible help system.

You can edit files from any previous *WordStar* release without converting them (and convert *WordStar* 5.0 files for use with earlier releases). You no longer need to configure *WordStar* for a single printer. As with *WordStar 2000*, printer definition files now allow you to configure *WordStar* 5.0 for a variety of printers (in addition to ASCII or draft output), any one of which you can choose at print time.

When it comes to spelling and thesaurus help, I've been a resolute *Combo* user. Even though *Combo* is supposed to support *WordStar Professional*, for me it always overwrites, except when *WordStar* 5.0 is in insert mode. Because of this, I have (somewhat reluctantly) added the additional disk space for *WordStar*'s thesaurus and spelling dictionary. The 100,000-word spelling dictionary and 220,000 synonyms are compressed so that they occupy 65 percent less disk space than they might have otherwise. Both are fast and handy to use. The Speller shows definitions, if you count single words or very short phrases—but nothing faintly resembling a real dictionary, which would be disk-space prohibitive. The Speller automatically performs a word count and begins proofreading the document from the cursor's location.

In a Supporting Role

With *WordStar* 5.0, you also receive MailList, which lets you create and sort lists for such things as mass mailings, inventory, or telephone numbers. This program comes with files preset for printing to envelopes, labels, and Rolodex cards. You can also use conventional databases with *WordStar*, without resorting to MailList. *WordStar* lets you import *Lotus*, *Quattro*, and *dBase* files as data files for mail merging (I use *Smart* to export to *WordStar* in ASCII format).

A full-featured telecommunications program, TelMerge, is also included with *WordStar* 5.0. I've used it to download and upload to bulletin boards, but it can also be used with networks and communications services. TelMerge supports color and pixel graphics. It also lets you exit to *WordStar* or DOS while online and view files or edit letters before sending them. One note here: TelMerge is supposed to automatically strip out all unnecessary characters during an ASCII transfer for a clean transmission. I found myself uploading gibberish and odd glyphs unless I wrote my *WordStar* files as ASCII files (which you can print to disk) before the TelMerge transmission.

ProFinder, another program included with *WordStar* 5.0, organizes your files and directories. It can tag and untag files and sort them by date, time, size, filename, or extension. You could perform the same functions with *PCBoss*, *XTree*, *Commando*, and a half-dozen other programs, but ProFinder

FAST FACTS

Title:	*WordStar Professional*, Release 5.0
Category:	Word processor
Features:	Advanced page preview; pull-down menus; multiple columns; spelling checker and thesaurus; laser-printer support; includes MailList, TelMerge, ProFinder, and *PC-Outline* programs
Requirements:	IBM PC, Tandy, or compatible; 384K (512K to use advanced page preview and *PC-Outline*); two drives or one drive and a hard disk; graphics adapter required for advanced page preview
Publisher:	MicroPro International 33 San Pablo Ave. San Rafael, CA 94903
Price:	$495.00

lets you toggle among *WordStar, WordStar 2000,* and ASCII formats. More importantly, it lets you search multiple files for a word or phrase. This is especially helpful when you need to find, for example, a single reference in all of your correspondence on a particular project or all references to *mass* and *spin* in your papers on particle theory.

PC-Outline (from Brown Bag Software) is also included with *WordStar* 5.0 and can be loaded as a RAM-resident program. MicroPro claims that it provides the most extensive outline capabilities available with any word processor. It allows traditional, decimal, or bullet numbering, and it reads, writes, imports, and exports text to a wide variety of file formats. *PC-Outline* also uses templates, macros, and movable windows (up to nine).

Dwarf Star to Supernova

Installation of *WordStar* 5.0 is quite simple. Previous *WordStar* users can copy files, run WINSTALL, and be up and running in minutes. Veteran users of *WordStar* will be pleasantly surprised by the many advances in this release, which are very substantial as compared to earlier versions.

As a businessman, book editor, and freelance writer, I'm delighted with MicroPro's new release. I can appreciate being hamstrung by older word processors, since I often begin by writing at home on my old 3.30 CP/M version of *WordStar*. Now, with my MS-DOS computer at work, *WordStar Professional,* release 5.0 automatically reformats my paragraphs and gives me full editing capabilities. It lets me preview my pages and add endnotes or a contents page to technical papers.

For anyone who writes book-length manuscripts, labors over research reports, or writes tons of letters, *WordStar* 5.0 definitely has the power to make your life a little easier.

PRD+ (Productivity Plus)

Clifton Karnes

If you sat down at your computer with your favorite word processor loaded and typed

adcom
d Editor,
Tufl of jan 6, 1988. Pls send us 3000 copies of t jan issue of cpc. Ifqs, plsasap.

vty

you'd get strange looks from anyone watching over your shoulder.

But if you had *PRD+ (Productivity Plus)* loaded, your computer's screen might look like this:

COMPUTE! Publications
324 W. Wendover Avenue
Suite 200
Greensboro, NC 27408

Dear Editor,

Thank you for your letter of January 6, 1988. Please send us 3000 copies of the January issue of *COMPUTE!'s PC Magazine*. If you have any questions, please let us hear from you as soon as possible.

Very truly yours,

PRD+ is a TSR (Terminate and Stay Resident) program that instantly translates shorthand—or short forms—into the text it represents. At first, *PRD+* may sound like just another keyboard macro program, but it isn't.

Macros with a Difference

Most keyboard macro programs let you assign strings to keys and key combinations. With *PRD+*, you can assign strings to *strings*. So *asap* can mean *as soon as possible,* and *vty* can stand for *Very truly yours.*

You can also assign strings and commands to keys and key combinations, so you have the power of a traditional dedicated keyboard macro program, too.

Getting started is easy. You simply put the *PRD+* disk in your drive and type INSTALL at the command line. In a few minutes, you'll be using the program.

When *PRD+* is in memory, the default short forms are at your beck and call. You can use them at the command line; with your word processor, spreadsheet, or database; with a programming language; or with almost any application in which you enter text or commands.

To get the feel of the program, you can begin by typing a few short forms at the command line. If you type *t* followed by a space, Enter, or any punctuation mark, you'll see the word *the* on your screen. If you type *acon,* you'll find *according to our conversation of* displayed, and so on. If you want to skip a short form's expansion, you end it with Ctrl-— (that's Ctrl-minus). So *temp* followed by Ctrl-— stays *temp* and doesn't burst into *temporary.*

The Long and Short of It

Expanding shorthand is what *PRD+* is all about, but the key to the program's power is its menu. To call the menu to the screen, press the Control key twice (this hot key can be redefined).

The main menu displays a screen of short forms with menu selections at the bottom of the page. To navigate *PRD+*'s menu, you can move your cursor to menu selections or press the first letter of each menu's name to highlight it.

The menu gives you the power to view, add, delete, change, rename, or record any strings or keyboard commands. You also can load new short forms (many are provided with the package), toggle *PRD+* off (leaving the program in memory), or unload the program from memory altogether.

To add a short form, you simply choose Add from the main menu.

PRD+ asks you the name of the short form and the keystrokes you want the short form to stand for. If you change your mind about the short form later, editing the form is as easy as choosing Edit from the menu and typing your changes in the box provided.

There are some rules you'll have to follow when you name your short forms. First, the short form can't be longer than eight characters. This is fine because you want your short forms to be as short as possible. Next you're limited to letters, numbers, and a few symbols (−, +, =, /, *, and _). Expansions of short forms, however, can be almost anything, including other short forms.

PRD+'s expansion of your short forms is triggered by delimiters—characters that usually signal the end of a word. *PRD+*'s delimiters include the Enter key, all common punctuation marks, quotation marks, parentheses, and brackets. As mentioned above, you can skip expansion by ending a short form with Ctrl-−. And if you want to work for a while without *PRD+*'s help, you can toggle the program off.

If you find yourself wondering what to do next while using the menu, help is never far away. Simply press F1 and you'll get a screen of useful information.

After you've made some additions and changes to a short-form file, you'll want to save it. You can save the current form with a new name or overwrite the existing name. And you can always use the menu to load a new short form.

After you've created a few short forms, you'll find that creating macros is just as easy. You simply tell the program you want to define a single-key macro and you're off. *PRD+* records your keystrokes and places them in the short-form window for editing.

Making It Count

PRD+ can obviously save you thousands of keystrokes a day and hours of work a week, but one of the program's nicest features takes the guesswork out of determining just how much *PRD+* is helping you.

While you type away, *PRD+* is not only expanding your short forms and macros; it's keeping track of how many characters you type, how many are saved; your elapsed time, productive time, and time saved; and the percent of savings. It also tracks your words-per-minute rate with and without *PRD+*. You can display this data at any time from the menu by selecting Options followed by Savings. If you're learning to type, trying to improve your typing, or typing for a living, *PRD+*'s recordkeeping is a handy feature.

FAST FACTS

Title:	*PRD+ (Productivity Plus)*
Category:	Keyboard enhancement
Features:	Expands shorthand and keystroke macros, provides many macros for popular programs, and is menu-driven
Requirements:	IBM PC, XT, AT, PS/2, or compatible with DOS 2.0 or higher; 52K required for the program
Publisher:	Productivity Software International 1220 Broadway New York, NY 10001
Price:	$89.95

PRD+ makes it easy to design your own short forms, but, to give you as much of a head start as possible, the program comes with complete sets of macros for *Lotus 1-2-3, Paradox, COBOL, BASIC, FORTRAN, WordStar 2000, Pascal, dBase III, Hewlett-Packard LaserJet,* and *RBase.* Also included are abbreviations used by the U.S. Air Force and U.S. Navy, the legal profession, the medical profession, and the accounting profession.

With all of *PRD+*'s power, you'd expect it to use a chunk of memory—and it does. The program and the PPLUS short form take about 80K. This is nothing to sneeze at, but most people should be able to afford this much memory.

It's hard not to like *PRD+*. It's powerful, easy to use, flexible, and reasonably priced. If you spend much time in front of a computer keyboard, *PRD+* can save you keystrokes and time, and (perhaps best of all) it's fun to use.

Learning DOS

Ervin Bobo

If you want to learn anything well, go to the source. You can't do that in mathematics or English, but you can go to the source of MS-DOS—Microsoft. The experts at Microsoft invented DOS; now they're going to teach it.

Learning DOS is a two-disk series of programmed lessons structured so that you can learn at your own pace. The program also includes a third disk as a reference guide.

Strangely enough, the printed instructions don't explain how to load *Learning DOS.* If you're a DOS novice, you may be stuck for a while. If you're familiar with DOS, you'll probably know to try the LEARN file with its .COM suffix.

The first thing you're asked is whether you have a color monitor. If your answer is *yes,* you'll be treated to lessons with some colorful but rudimentary animation; if your answer is *no,* you'll get the same lessons without the color.

Start Learning DOS

The first lesson teaches you how to use *Learning DOS,* and it's a necessity. You'll learn to move from one screen of information to the next by pressing the space bar, but only when a special prompt is showing in the lower right corner of the screen. Because certain paragraphs and clauses appear piecemeal—giving you time to absorb each part—the prompt is not always visible.

The lesson within a lesson teaches other key combinations that allow you to find your way around the classroom. Alt–space bar allows you to skip over practice sessions, and Ctrl–space bar calls up a menu of commands, including Hint (for those times when you've forgotten what you just learned). Back (to reverse one or more screens), Practice (if you feel you need more), and Index (if you want to study a specific facet of DOS) are also explained.

Once the tutorial is finished, you return to the main menu for a list of the real lessons. What You Can Accomplish with DOS is an overview, and Getting Started calls up a second menu of lessons. Though nothing is made of

it in the tutorials, this business of one menu leading to a submenu may actually be an unintended subliminal tutorial on the tree structure of directories.

Each lesson consists of several parts. The Title spells out the contents of the lesson, while the Overview introduces new concepts. The steps are then outlined, and you are taken to a practice session where you actually type in the DOS commands you've just learned. Following this is a summary and, frequently, there's also a troubleshooting guide that solves problems such as what to do if you get a NON-SYSTEM DISK ERROR message.

FAST FACTS

Title:	*Learning DOS*
Category:	DOS tutorial
Features:	A two-disk tutorial and a separate reference disk
Requirements:	IBM PC or compatible, one disk drive, 256K
Publisher:	Microsoft 16011 NE 36th Wy. Redmond, WA 98023
Price:	$49.95

As you complete each lesson on a menu, a check mark is placed near it, and the program won't select that lesson again unless you insist. While many will want to go through the lessons in the proper order, it's not mandatory. *Learning DOS* allows you to skip lessons, parts of lessons, and practice sessions—something most teachers would never permit.

Just the Necessities

Though *Learning DOS* consists of one reference and two tutorial disks, the tutorials are divided more by subject matter—or, more precisely, along the lines of haves and have-nots. One tutorial is for systems with a hard disk, and the other is for systems without a hard disk. The lessons are identical except that one tutorial never mentions hard drives. This is in keeping with an overall philosophy of giving the student no more information than is necessary. Unfortunately, it's this philosophy that leads to some holes in the tutorial.

In the section on viewing files, you're warned that some directory listings may scroll off the screen and that you can prevent this by hitting the No Scroll or Scroll Lock key. The program ignores other methods, such as typing DIR/P to pause the listing automatically or DIR/W to list files three abreast, which keeps most directory listings on a single screen.

The section on running an application explains how to boot *Microsoft Word* and *Microsoft Multiplan*, but it says nothing about how to recognize the executable files on other disks (usually by a .COM or an .EXE extension). When the lesson explains how to format a floppy disk, there's no mention of how to format it with the system by typing FORMAT/S. Likewise, in the section on copying a DOS disk, the DISKCOPY command is explained, but there is no mention of the COPY command. Evidently, Microsoft considers some commonly used commands to be too confusing for beginners.

In discussing a relatively simple command such as DISKCOPY, *Learning DOS* shows the command in its full form and proper sequence. It graphically breaks the command down into component parts: DISKCOPY, A:, and B: are each separately highlighted and explained. Explanations in the form of paragraphs appear near the components, with pointing arrows leaving no doubt as to which explanation belongs with which component.

It's probably the most logical way of explaining the command. Yet the lesson stops short of being complete—neglecting the matter of spacing, always my stumbling block to using DOS effectively. If you're a stranger to DOS, I'll simply point out that a space inserted where none should be, or no space where there should be one, can unexpectedly change the results. In this instance, an extra space could stop a command from executing, and a missing space could mean a command directed to drive B would go unrecognized.

The omissions I've noted in *Learning DOS* aren't really significant, though. They reflect Microsoft's decision to cover no more than a novice can handle. For a more complete guide to DOS, there's always that bulky reference manual.

A Ready Reference

It should be noted that while some commands are not mentioned in the regular tutorials, you can find them on the reference disk. This third disk is the electronic equivalent of a quick-reference card. It stays in the background while you're using DOS and can be called up at any time. Select the DOS command and a box appears on the screen with a reminder of how to use that command.

There is one drawback to using the reference disk: It fills most of your screen with indexes and explanations, leaving you with only a four-line area to work in. Still, for those who have some knowledge of DOS but rarely use it, this may be the most valuable part of the package.

As for the documentation, it's slight and functions more as a reference than as a tutorial, simply repeating in shortened form most of the lessons covered on the disk.

Learning DOS is a useful tutorial for anyone just starting out with a PC, as well as for those of us who have nibbled at DOS and digested only enough to keep us out of trouble. Since it won't tell you everything you need to know about DOS, it's best seen as an introduction to the most common commands, rather than as a complete course. ▷

Advertisers Index

Reader Service Number/Advertiser	Page
102 The Avalon Hill Game Company	1
103 California Freeware	53
Cinemaware	13
104 Compsult	75
105 Computer Direct	46–47
106 Computers Software & Support	20
107 Computer Solutions, NW	69
108 COVOX, inc.	34
109 Data Security Insurance	75
110 Freeware Unlimited	49
111 General Quarters Software	20
112 Gosselin Computer Consultants	75
113 Indus-Tool	52
114 Ishi Press International	16
115 LucasFilm, LTD.	BC
116 Lyco Computer	40–41
117 Mad Scientist Software	34
McGraw-Hill	25
MicroCom Systems	14
119 MicroMedia	54
120 Micro Star	21
118 MicroTac	20
121 Paragon Software	IFC
122 Parsons Technology	2
123 Parsons Technology	4
124 Parsons Technology	15
125 Renco Computer Printer Supply	52
126 Smart Luck Computer Systems	8
127 Soft-Byte	20
128 Software Excitement	55
129 Strategic Simulations, Inc.	IBC
130 T/Maker Research Company	19

COMPUTE!'s PC Back Issues	29
COMPUTE!'s Subscription	76
COMPUTE!'s PC Subscription	77

PrintPower and *Sesame Street Print Kit*

Thomas Cox

Brøderbund's *Print Shop* ignited a round of printing wars that hasn't cooled down yet. Will *Print Shop* keep its title as the number 1 home printing program, or will Hi Tech's two new contenders unseat it? *Print Shop* has an edge, but Hi Tech has a secret weapon.

PrintPower and *Sesame Street Print Kit* share many similarities. Both programs allow you to lay out and print 8½ × 11 inch pages using built-in fonts and graphics. Each program prints banners of any length (on continuous-feed computer paper), greeting cards on a single page, and one-page flyers and announcements. Both programs use the same format for storing the stock of provided graphics on disk, and finally, both programs have identical interfaces.

Setting Up Shop

Setup is easy: You simply make a back-up disk and choose your printer. From that point on, you're ready to work. The supported printers are listed on the outside of the program box. If your printer is on the list, you're fine. If it isn't, you're out of luck. (Inside the package, there's a list of a few additional supported printers, but you have no way of knowing if your printer is on that list before opening the box.)

The layout portion of both programs uses a split screen. The top half displays the template—a view of what the page roughly looks like. You use this view for positioning graphic images on the page. The bottom half of the screen is a menu containing some, but unfortunately not all, of the currently available commands.

When you start the program, you specify what type of document you want to design—a banner, flyer, or card. (Additionally, *Print Kit* offers the choice of Story Book, which is just like the flyer.) Next, you choose either to continue work on an old document or to create a new one. Then you're ready to edit.

Design a Page

Layout is straightforward. First, you choose the border you want (half-inch, one inch, or none) and the border pattern you want to use (such as spiral or bars). A border can be on all four edges, any one edge, or any pair of opposite edges. Different border styles are shown on a sample sheet included with the documentation. This is a necessity because, unlike Brøderbund's *Print Shop*, these programs don't let you see the border patterns on the screen.

If you want to use a graphic, you choose its size. Each image on the disk can be full-page, half-page, quarter-page, or in one- or two-inch size. You can place multiple copies of an image in different parts of the page, but you're limited to one size of one image per page.

FAST FACTS

Title:	*PrintPower* and *Sesame Street Print Kit*
Category:	Printer utility
Features:	Prints flyers, greeting cards, banners, and signs; *Sesame Street Print Kit* also prints storybooks
Requirements:	IBM PC, compatible, or Tandy with 256K and CGA
Publisher:	Hi Tech Expressions 584 Broadway #1105 New York, NY 10012
Price:	$14.95 each

Your ability to place graphics is limited. An image in half-page size, for example, can be placed only on the top or bottom half of the page—there is no way to place that image in the center. This prevents you from overlapping multiple copies of an image, but it also restricts your ability to lay out a page the way you want. With smaller graphics you have a few more options, but the basic problem remains.

As is the case with borders and fonts, the real graphic images aren't displayed on the screen. All you see during placement is a large colored box the size of the real image. You don't get to see the real image until you print. The images are shown on the sample card with the border patterns.

Finally, you can choose your font and then type your text. It's at this point that the split screen is most helpful. The top half shows where the text you're typing will be on the page in relation to the graphics and the border you placed earlier. You can place text right over the top of a graphic, and in some cases—such as when a Muppet holds a blank sign that's just waiting for your text—you'll want to.

Text is represented in the top half of the split screen by blobs of color (a process called *greeking*) showing the approximate size and location of the real text, which you can see and edit below. Both *PrintPower* and *Print Kit* have fairly accurate greeking. With both programs, you can have as many as four fonts and three font sizes per page, although each line of text is limited to one font at one size. And each line of text can have a different font modifier; one can be boldfaced, the next italic, and so on. Seven modifiers are available, although they can't be combined on one line.

Head to Head

Both programs have a few problems. For example, in *PrintPower*, if you choose to work on an old document and no such document has been saved, you're told "Nothing has not been saved yet." Keep this program away from anyone learning English.

Worse, the only way *PrintPower* will save *any* document is for you to print it. For some reason, *PrintPower* assumes that if you exit your new document without printing it, you must not want to save it. *Print Kit* manages to save your latest document whether or not you've printed it. You can save only one document, and only as long as you don't make a new one. Neither program allows you to save your compositions in a separate, named file. This is a major drawback.

The most frustrating problem is escaping from the text-edit mode back to the main menu. The command summary never lists Ctrl-X as a way to exit,

but the documentation does. In fact, that's the only way to exit, short of hitting Enter until you go off the bottom of the page.

There are other shortcomings, too. If, for example, the last thing you made was a banner, and you tell the program to work on an old greeting card in wide orientation, you are told, "Your last creation was not a Wide Card." It doesn't bother to tell you what your last creation was. There is no excuse for that: If the program is smart enough to know the identity of the saved document (how else would it know it's not a wide card?), then it should be able to share the information with you.

Of the two programs, *Print Kit* is more recent, has slightly better handling of the print function, and has a better save feature. You may want to get both for the array of graphics. If you choose this option, use the *Print Kit* program to do your actual work.

Like disposable lighters, these programs are not intended for long or heavy use. Both utilities resemble *Print Shop*, and although neither *PrintPower* nor *Sesame Street Print Kit* is as sophisticated as Brøderbund's all-time best seller, their secret weapon is a price of $14.95 each, which may make them the right choice for stocking-stuffers or birthday gifts.

Mindviewer

Ervin Bobo

Three years ago, *Mind Prober* was one of the best-selling programs in all computer formats. Designed by Dr. Jim Johnson, a therapist, teacher, and researcher of personality assessment, *Mind Prober* digested descriptions of personality traits, then presented you with a personality profile.

Had the program been better, it might have achieved more status. I thought it did little more than take my comments, rephrase them, and feed them back, much as the famous *Eliza* program does. *Mind Prober* needed more work to become what it professed to be.

Apparently Dr. Johnson thought so, too. He has been working at the computer again, and this time he has come up with *Mindviewer*. The term *personality software* may be your only clue as to what's in the box. In place of the usual exaggerated but generally descriptive blurbs, there are only a few letters of testimonial from such anonymous figures as C. Kent (commenting on his success with Lois) and R. Butler (who finally gives a damn).

Fortunately, the software designers at Provocative Software (a division of Dexxa) seem to have been less frivolous than the box designers, for inside the box is a program that may do exactly what it claims.

You begin by personalizing your copy to stem piracy. Once this is completed, you enter information on the person whose personality you wish to analyze: name, age, and sex. (Alternatively, you may review an assessment you've done previously, using the name as a guide to the correct file.)

Rate the Traits

Once in the heart of the program, you supply a rating of your subject in terms of such character traits as achievement, ambition, brilliance, and so on. Your rating on each trait ranges from 1 (Agree) to 4 (Disagree).

In case you don't understand a term, the lower part of the screen provides a short definition, such as *Achieving: known for succeeding.* If you're still not sure, or if you aren't certain which degree to assign, you can leave the trait line with its default question mark and go on to the next. There is little point in leaving items blank, however, unless you're going to call the subject and ask for his or her assessment, because incomplete reports can't be analyzed.

Contradictory assessments can't be analyzed, either. Some traits are made

Data Security Insurance offers two policies for computers, each with essential coverages not available elsewhere. As low as $35/year.
DATA SECURITY INSURANCE
INSURE YOUR COMPUTER AGAINST ACCIDENTAL BREAKAGE
1-800-822-0901

SOFTWARE CLOSEOUT
IBM, MAC, APPLE II, COMMODORE, ATARI & MANY MORE!!!!
SPINNAKER, SYNAPSE, INFOCOM, ARTSCI, AVLON HILL, MICROSOFT, IBM, MIRAGE & MANY OTHERS!!!!
COMPSULT
P.O. BOX 3233
SAN LUIS OBISPO, CA
93403-3233
(805) 544-6616
PREPAID MAIL-IN ORDERS ARE ENTITLED TO A 10% DISCOUNT!! DEALERS ARE ALWAYS WELCOME. CALL FOR QUANTITY DISCOUNTS. EDUCATIONAL & OTHER GROUP DISCOUNTS ARE AVAILABLE..CALL! NEW ITEMS ARE ADDED WEEKLY. ALL ITEMS ARE NEW IN ORIGINAL PACKAGING! SUPPLIES LIMITED & CHANGE DAILY.....CALL NOW!!!!!!!
CALL OR WRITE FOR....
FREE PRICE LIST!!!
OUR PRICES ARE THE LOWEST!! MOST ITEMS PRICED UNDER $10 MANY NAME BRANDS UNDER $5

ATTENTION ROLE PLAYERS
TIRED OF GETTING BEAT UP BY THE MONSTERS. FIGHT BACK WITH THE FOLLOWING PRODUCTS. BUILD UP YOUR CHARACTERS WITH OUR EDITORS OR SOLVE THE RIDDLES WITH OUR HINT BOOKS.
- CHARACTER EDITORS - $19.95 each - Might and Magic, Ultima 3, Ultima 4, Ultima 5, Bard's Tale 1, Phantasie 1, Phantasie 3, Sentinel Worlds 1
- HINT BOOKS -$9.95 each Might and Magic, Return of Werdna, Wizardry 1, Wizardry 2, Wizardry 3.
- OTHER MIGHT AND MAGIC PRODUCTS Monster Editor - $12.95 Users Group membership - $10.00

Apple and Commodore version also available. Add $3.00 for shipping and handling.
GOSSELIN COMPUTER CONSULTANTS
P.O. Box 1083
Brighton, MI 48116
(313) 229-2453
VISA MasterCard

deliberately redundant by rephrasing, and a wide divergence between answers may cause the program to generate a message stating it's unable to compile a report on the subject.

There is one difficulty with all this: If you can answer the questions with a high degree of accuracy, you probably know the subject well enough without needing the computer's intervention. Simply sitting quietly and thinking about the person would probably do the job as well.

Another thought I have is this: Generally, we like, dislike, or have neutral feelings about people as a result of their personality. Those we like, we probably know why. For the others, we may never get close enough to know what it is about them that leads us to not like them.

Desires, Passions, and Anxieties

If you're wondering what group of people is left, there are some—the attractive girl behind the 7-Eleven counter or the handsome guy you see at the bus stop every morning. They seem to be nice people you'd like to know better, people you might even like to date. And since *Mindviewer* purports to reveal her "hiddenmost desire," his "secret passion," her "ulterior motives," and his "repressed anxieties," there is probably a temptation to rush home and run them through *Mindviewer*. Once you find all the secret buttons and all the things that interest and excite these people, perhaps the next time you meet, they'll fall into your waiting arms.

No way. Not unless you already know them well enough to place an objective value on such traits as toughness, reliability, moodiness, leadership, and a host of others. If you think you can supply the answers, remember that answers skewed by a lack of knowledge will result in a report skewed by faulty information. You may be told flowers will dazzle her, only to find she was hoping you'd ask her to a mud-wrestling match. The program may tell you he likes ZZ-Top when he really loves Mozart and Brahms.

FAST FACTS

Title:	*Mindviewer*
Category:	Personality assessment
Features:	Produces charts and reports for personality analysis
Requirements:	IBM or compatible PC, 256K of RAM
Publisher:	Dexxa International 189 Airport Blvd. Burlingame, CA 94010
Price:	$49.95

A Detailed Report

Before it produces its written report, *Mindviewer* presents a chart that has reduced all the redundant questions to six

THE #1 HOME COMPUTER MAGAZINE!
COMPUTE! COVERS IT ALL!

41 GREAT HOLIDAY GIFT IDEAS
COMPUTE!
The Leading Magazine of Home, Educational, and Recreational Computing
COMPUTE! Celebrating its 10th YEAR
SIGHTS & SOUNDS!
YOUR COMPUTER CAN CREATE HOLLYWOOD HOME VIDEOS
Step-by-Step Guide to Titling, Animation, & More
MOTOWN MUSIC
6 Top Products Put Digital Sound at Your Fingertips
PLUS! SPECIAL REVIEWS ON
VCR Companion
Homs Video Producer
Yamaha C1 Music Computer

When you're looking for the *complete* story on the state of home computing, turn to *COMPUTE!* magazine. Celebrating its tenth year of publication, *COMPUTE!* has always spoken for and to the home computer user. Not to the high-powered business user, but to everyone who wants a computer in the home or who wants to get more out of the machine already there.

It doesn't matter what personal computer you own—an IBM PC or compatible, an Apple II, a Commodore 64, a Macintosh, an Amiga, an Atari ST, or any other machine—you'll find *COMPUTE!* the one-stop resource to the latest in

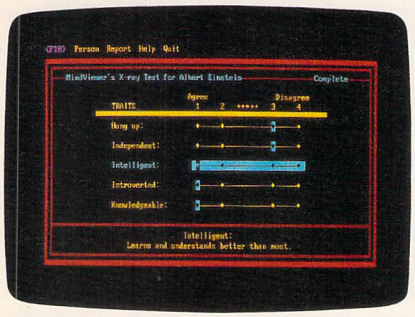
- Home computer entertainment
- Home computer learning
- Home computer productivity

In-depth and focused features, news on the home computer industry, product reviews, persuasive columns, thoughtful analysis—it's all here in the one magazine that no home computer user can afford to ignore.

Subscribe Today to *COMPUTE!*

Only $24.00 for 12 issues—one full year! Call 1-800-727-6937

Or write: COMPUTE!
P.O. Box 10955
Des Moines, IA 50347-0955



Explore personality traits with MindViewer.

broad character traits. From pull-down menus, choose to save the report to disk, print it to your screen, or send it to your printer for a hardcopy. In any case, it will present you with several screen pages of text on your subject.

Interestingly, this report does not seem to contain the simple rephrasing of Dr. Johnson's earlier program. Instead, the report expands upon what you already know about the subject, but perhaps haven't put together quite this way—which probably is the most an objective computer will ever do with a subjective topic.

The Secrets category is subtitled *What She (He) Will Deny.* OK, I'll buy it. I'm certainly not going to ask the girl at the 7-Eleven if it's true in her heart of hearts that she wants to wrestle in a vat of strawberry jam. If you want to ask her, though, go ahead.

Hits and Misses

On a more serious note, I first tried analyzing my wife and then (fair is fair) let her analyze me. In both cases, we agreed there were some accuracies and some inaccuracies. This is understandable because a shotgun approach succeeds in several areas, whether it be handwriting analysis, carnival fortune-telling, or computer personality analysis.

It occurs to me that the best way for you to unlock the secrets of a stranger is to ask him or her for a date, take the person back to your place, and suggest playing *Mindviewer.* You and your date analyze each other and then read the reports together. If your date analyzes him- or herself and lets you read that report, you probably already have enough trust for hopes of a good relationship.

Bear in mind, however, that once you've married your dream date, you may find that your spouse objects to your bringing in strangers for personality assessments.

With that in mind, accept *Mindviewer* for what it really is: an interesting diversion, a party game that will probably embarrass some subjects, but one that offers an evening of computer entertainment where no aliens die. **PC**

The Best of Both Worlds!

COMPUTE!'s PC Magazine

Great reading and great programs every two months!

Included with each issue is a disk packed with terrific programs:

- Games you can't stop playing
- Indispensable utilities
- Applications tools to make your life simpler
- And more!

And when you're not running your machine, you'll want to read every page of the most interesting PC magazine around:

- Provocative columns
- Helpful tutorials
- Fascinating features
- In-depth product reviews

All of which makes *COMPUTE!'s PC Magazine* required reading for anyone interested in the world of MS-DOS.

Available in both 5¼- and 3½-inch formats.

COMPUTE!'s PC Magazine
Subscribe Today!

$39.95 for a full year—six issues!

Call 1-800-727-6937
Or write: COMPUTE!'s PC Magazine
P.O. Box 10767
Des Moines, IA 50347-0767

Start Your Own Team

Players of Accolade's *4th & Inches* can now create their own football players and teams with the *4th & Inches Team Construction Disk*. Design or modify home and visiting teams and test them on the gridiron in *4th & Inches*.

You can assign specific stats to each of the team members, including their heights, weights, experience, and skills (such as speedy, fast, quick, steady, solid, strong, tough, and big). The tailored teams can then be substituted for the standard teams on the game disk.

Players can also select the jersey colors of each team and name each player and team. The construction disk also includes a library of six prebuilt teams.

4th & Inches Team Construction Disk has a suggested retail price of $14.95.

Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128
Circle Reader Service Number 200.

PC Game Show

Fans of the television game show "Win, Lose, or Draw" can now play the game on their IBM PC or compatible. Hi Tech Expressions has released an interactive computer version of the popular TV charades game.

Players guess famous quotations, titles, and phrases from clues drawn by the computer. Each game randomly chooses from hundreds of selections.

The game simulates a living-room atmosphere onscreen and uses music and animated characters. As players try to guess the computer's clues, a designated typist has 60 seconds to punch in the team's response.

The computer game provides a built-in judge for correct answers. Partial answers are noted by the computer, but gameplay continues until the complete phrase is keyed in or the timer runs out. The game can be played alone, against the computer, or with large groups of people.

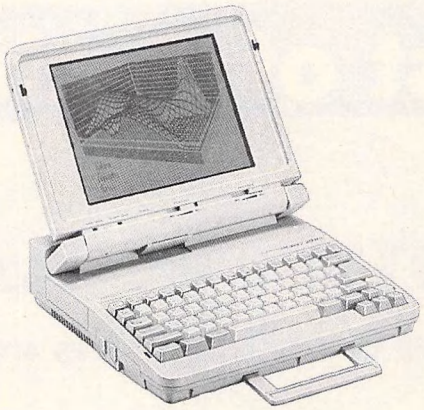
Win, Lose, or Draw requires a color monitor and 256K of memory. The suggested retail price is $12.95.

Hi Tech Expressions, 584 Broadway, New York, NY 10012
Circle Reader Service Number 201.

Do It Yourself

The Heath Company has introduced a laptop computer kit that can do everything a standard desktop computer can do. Fully PC- and AT-compatible, the HS-2860 has a 12-MHz 80286 processor with one megabyte of standard RAM that can be expanded to three megabytes on the main board.

The HS-2860 can handle spreadsheets, databases, word processing, and graphics. It has one 1.4-megabyte 3½-inch disk drive and a second internal floppy disk drive, with 20- and 40-megabyte internal hard disks available as options.



Put together your own Heath HS-2860 laptop.

Standard features include a 640 × 400 pixel resolution supertwist LCD screen, a removable battery pack that provides up to six hours of continuous operation, expanded memory support, parallel and serial ports, an RGB video port, and an external floppy drive jack. The computer's dimensions measure, in inches, 3.07 (height) × 12.2 (width) × 15.4 (depth).

The kit has a suggested retail price of $2,999.00.

Heath Company, Hilltop Rd., St. Joseph, MI 49085
Circle Reader Service Number 202.

From Wimbledon to Monaco

Accolade has released two new sports simulation games—*Serve & Volley* and *Grand Prix Circuit*.

Serve & Volley simulates action on the tennis courts. Players must make careful stroke selections and correct ball placements, use accurate timing, and anticipate the correct court position after each ground stroke, volley, and serve. In addition, the Strobe-O-Stroke feature uses action windows with animated racket movement to time each hit or serve.

You can choose from several serves or ground strokes and play the game at the beginner, intermediate, or advanced level. Other game options include a choice of court surfaces and either match or tournament play.

You can adjust the players' skill levels for endurance versus speed, forehand versus backhand, and power versus accuracy. You can also save the players' statistics. This allows users to become spectators and watch a match or tournament with the computer controlling both players, according to their stats. Each match or tournament can be saved or resumed.

This one- or two-player game is available for the IBM PC and sells for $39.95.

In the tradition of its successful driving simulation, *Test Drive*, Accolade has released *Grand Prix Circuit*, a racing simulation based on the Formula One series.

Players can represent either the McLaren, Ferrari, or Williams team at Monaco, Japan, Detroit, Germany, or four other track layouts. Other options include the choice of difficulty levels, ranging from beginner to expert, and three modes of play—qualifying lap, single race, or Grand Prix Championship.

After selecting the options, players must qualify in a field of ten cars. Players then race to accumulate points against the other nine racers, each with their own personality and driving characteristics, to become the world driving champion.

Features that add to the realism of

the game include cars that show damage after mishaps on the track, functional rearview mirrors, accurate representations of each track including overpasses and tunnels, and authentic background scenery of each city.

Grand Prix Circuit is available for the IBM PC and compatibles and carries a suggested retail price of $39.95.

Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128

Circle Reader Service Number 203.

Formula One racing in Grand Prix Circuit.

A Big, Bad Cat

Players had better watch out for *Street Cat*, the toughest cat in the city and the latest release from the U.S. Gold line of games from Epyx.

The game features four events that test the cat's athletic ability and knowledge of the streets. In the city park sprint, cats make their way through an obstacle course. The cats then hop on their motorcycles where they run over roadside disks while trying not to be caught for speeding.

The next event, set in a swimming pool, requires the cats to float on platforms and knock geometric shapes off a diving board. If they stay dry, they can move on to the catwalk event in the sewer system, where they have to avoid rats, a mad dog, slimy pipes, and slippery barrels and ladders. Should a cat slip, it could wind up in the city cesspool.

In the final event, the cats bowl against a bulldog, only in this version of the game there are no pins. A cat and dog try to bowl each other over and into the gutter. Whoever gets bowled over has to drink a milkshake, and, after downing a few, it becomes difficult to move around.

Street Cat can be played individually, against an opponent, or against the computer. The game is available for the IBM PC and compatibles and has a suggested retail price of $24.95.

Epyx, 600 Galveston Dr., P.O. Box 8020, Redwood City, CA 94063

Circle Reader Service Number 204.

Classical Database

Classical-music devotees, broadcasters, and other music collectors can catalog their records, tapes, or compact discs with HomeCraft Computer Products' *For Record Collectors—The Classical Version.*

This version provides 21 lines of information that include the name of the composer, the title, the popular or alternative title, the name of the conductor and orchestra, the names of soloists, and the recording date. The program can also be used to keep a "want to buy" and a "trade" list.

The program features cross references to help users find all recordings written by one composer, list all the records from one record label, or initiate more complicated searches using more than one qualifier.

The original version of *For Record Collectors* is available for top 40, country, and rock collections.

Available for the IBM PC, PS/2, and compatibles, *For Record Collectors—The Classical Version* requires a minimum of 256K, with a hard disk recommended. The suggested retail price is $59.95.

HomeCraft, P.O. Box 974, Tualatin, OR 97062

Circle Reader Service Number 205.

Laptop Modem

Anchor Automation is now shipping its 2400-baud modems for use in Toshiba laptop computers. The Anchor 2400TLT has previously been available in Canada under the Toshiba label.

The modem is constructed exclusively with HCMOS components, which eliminate heat and help provide a clearer signal. Anchor guarantees that the modems are 100-percent Hayes compatible.

The suggested retail price for the Anchor 2400TLT is $299.00.

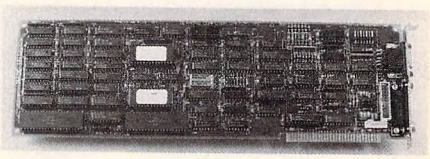
Anchor Automation, 20675 Bahama St., Chatsworth, CA 91311

Circle Reader Service Number 206.

Trackstar Upgrade

Diamond Computer Systems has released an upgrade to the Trackstar 128, which allows PC, XT, AT, and compatibles to run Apple IIe software. Trackstar E, a 65C02-based parallel processor board, features a streamlined user interface, hard disk support, network support, and file transfer between the MS-DOS and Apple formats.

The board can be inserted into a full-length slot in PC, XT, AT, and 386-class machines. Product specifications include a 128K on-board system memory, Apple standard 1-MHz clock, 40- and 80-column video, Apple-compatible 5¼-inch disk drive port, and Apple IIe- and IIc-compatible game ports. Support is provided for use of the PC hard disk for Apple files, as many as four disk drives for Apple ProDOS, up to two disk drives for Apple DOS 3.3, local area networks, standard Apple Serial and Parallel Ports, and use with IBM MDA-, Hercules-, and CGA-compatible monitors. Trackstar E can also transfer text or binary files between MS-DOS and Apple DOS 3.3 or ProDOS.



Trackstar E runs Apple IIe programs on a PC.

A field kit is available for users to upgrade an existing Trackstar 128 to a Trackstar E system.

The suggested retail price for the Trackstar E is $445.00.

Diamond Computer Systems, 470 Lakeside Dr., Sunnyvale, CA 94086

Circle Reader Service Number 207.

SAT Prep

Simon and Schuster Software has released a computerized preparation for the Scholastic Aptitude Test. *Simon & Schuster's Computer Study Guide for the SAT* provides users with two simulated exams.

Features include a built-in timer to monitor speed, an automatic scoring device to pinpoint right and wrong answers, a catalog of explanations for every question, and an online scratch pad for computations. Bar graphs display improvement charts and projected scores. All the required areas of study are covered in 25 practice modules, which contain over 500 questions. An online four-function calculator, an on-screen help menu, and test-taking strategies act as the student's College Board tutor. To simulate an actual test environment, the calculator locks out during the two tests.

The program's random-start feature allows a second-time test-taker to skip over the basics and review the more difficult areas of the test. A complete review of high school grammar is included with the Test of Standard Written English. The manual also features over 120 pages of exam tips and strategies.

Simon & Schuster's Computer Guide for the SAT is available for the IBM PC and compatibles and has a suggested retail price of $39.95.

Simon and Schuster Software, One Gulf + Western Plaza, New York, NY 10023

Circle Reader Service Number 208.

Multi-Font

A new 24-wire dot-matrix printer with four resident fonts has been released by Star Micronics. The NX-2400 Multi-Font is designed for use in homes and offices for word processing, desktop publishing, and computer-aided design applications.

Features include letter-quality output, quality graphics resolution, fast print speed, paper parking, and an expandable memory. The NX-2400 Multi-Font prints 170 cps (characters per second) in draft elite mode and 57 cps in letter-quality elite mode. For graphics applications, it offers 360 × 360 dpi (dots per inch) graphics resolution.

The printer comes with a parallel interface and incorporates Epson and IBM Proprinter X24 emulations. It has a 7K buffer that can be expanded to 39K with an optional 32K card.

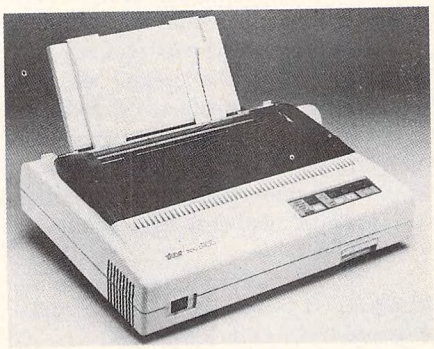
Its four resident fonts are Courier, Prestige, Orator, and Script. Optional cards provide up to three additional fonts. All type styles and print pitches can be printed in italics. Users can also expand their font library by downloading fonts and storing them on the printer's optional 32K RAM card.

The printer's paper-parking feature allows users to feed single sheets without removing tractor-fed fanfold paper.

The NX-2400 Multi-Font has a suggested retail price of $529.00.

Star Micronics, 200 Park Ave., Suite 3510, New York, NY 10166

Circle Reader Service Number 209.



The Multi-Font features four internal fonts.

Down! Set! Add! Subtract! Hike!

Students can learn to add, subtract, multiply, and divide fractions while playing a computer game of football in Gamco's new release, *Math Football: Fractions.*

One or two players compete in a choice of four levels: High School, which includes addition and subtraction fraction problems; College, featuring addition and subtraction of mixed numbers; Pro, including multiplication and division of fractions and mixed numbers; and the Super Bowl, which has mixed operations.

Players can choose a running play, which is an easy problem; a short pass, a medium-difficulty problem; a long pass, a hard problem; or they can punt. Correct answers result in yards gained, first downs, touchdowns, and extra points. Incorrect answers cause a loss of yards or a change in possession.

Teachers have the option to turn the sound on or off and set time limits for answering problems. You can also store the students' names and scores on the disk.

The IBM PC and compatibles version retails for $54.95. The package with a backup disk sells for $64.95, while the class pack and network package have a suggested retail price of $164.95 each.

Gamco, Box 1911, Big Spring, TX 79721

Circle Reader Service Number 210.

MemoryMate Meets DeskMate

A new version of *MemoryMate*, compatible with Tandy's DeskMate 3.0 operating system, has been released by Brøderbund Software. *MemoryMate*, a personal information manager, allows users to file random information without having to use key words or restrictive formats. To retrieve a file, users can enter any word, number, or combination of words it contains.

The program also has several new features including the ability to create multiple databases. It supports wildcard searches and can be used to create hypertext links within the program's records.

The maximum record size has been expanded to 120 lines, and search speed has been increased to 100K per second. There are also more editing options, shortcuts, and new printing options. *MemoryMate*'s data-file size is limited only by the size of the user's disk.

The Tandy DeskMate version also has several informational databases, including a DOS help file, toll-free phone numbers, area codes and time zones, and metric and ASCII conversions.

The suggested retail price for the Tandy DeskMate version is $59.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903-2101

Circle Reader Service Number 211.

— Compiled by Mickey McLean **PC**

COMPUTE!'s PC Magazine
FREE Reader Information Service

Use these cards to request FREE information about the products advertised in this issue. Clearly print or type your full name and address. Only one card should be used per person. Circle the numbers that correspond to the key number appearing in the advertisers index.

Send in the card and the advertisers will receive your inquiry. Although every effort is made to insure that only advertisers wishing to provide product information have reader service numbers, *COMPUTE!'s PC Magazine* cannot be responsible if advertisers do not provide literature to readers.

Please use these cards *only* for subscribing or for requesting product information. Check the expiration date on the card to insure proper handling.

Use these cards and this address only for *COMPUTE!'s PC Magazine* Reader Information Service.

COMPUTE!'s PC Magazine

100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116
117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133
134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167
168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201

Please let us know. Do you own: ☐ 270 IBM PC, ☐ 271 IBM PC Compatible, ☐ 272 Other _____ (specify model).

Do you plan to buy: ☐ 273 IBM PC, ☐ 274 IBM PC Compatible, ☐ 275 Other _____ (specify model).

How much did your PC system cost: ☐ 276 <$1,000, ☐ 277 $1,000–$1,500, ☐ 278 >$1,500

What do you use your PC system for: ☐ 279 Home productivity, ☐ 280 Business, ☐ 281 Education, ☐ 282 Games, ☐ 283 Other _____ (specify).

Please print or type name and address. Limit one card per person.

Name _____

Address _____

City _____

State/Province _____ Zip _____

Country _____

Please include zip code.

Expiration 4/30/89

ORDER A SUBSCRIPTION TO *COMPUTE!'s PC Magazine*

Send me my charter subscription for 6 issues (a full year's subscription) at this special introductory price of just **$39.95.** I save more than $37.00 off the newsstand price.

☐ Payment enclosed or

For Fastest Service, Call Our **Toll-Free** US Order Line **1-800-727-6937**

Name _____

Please Print

Address _____

City _____

State/Province _____ Zip _____

Country _____ Phone _____

Please include zip code.

Your subscription will begin with the next available issue. Please allow 4–6 weeks for delivery of first issue. Subscription prices subject to change at any time. Outside the USA, please add $6 for each subscription.

J2PN30

Place
Stamp
Here

COMPUTE!'s PC Magazine
P.O. Box 2141
Radnor, PA 19089

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

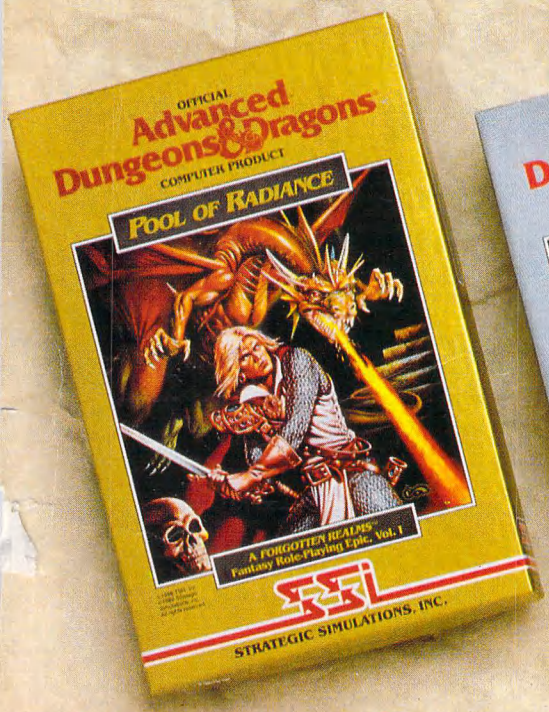
BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 7478 DES MOINES, IOWA

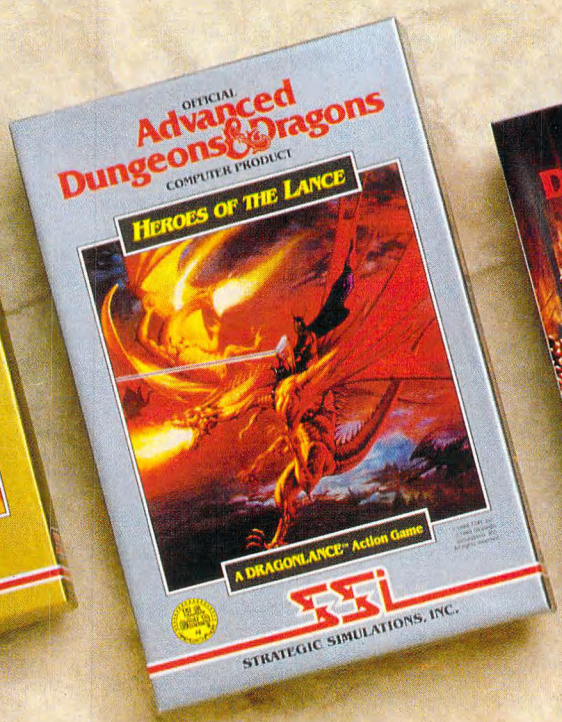
POSTAGE WILL BE PAID BY ADDRESSEE

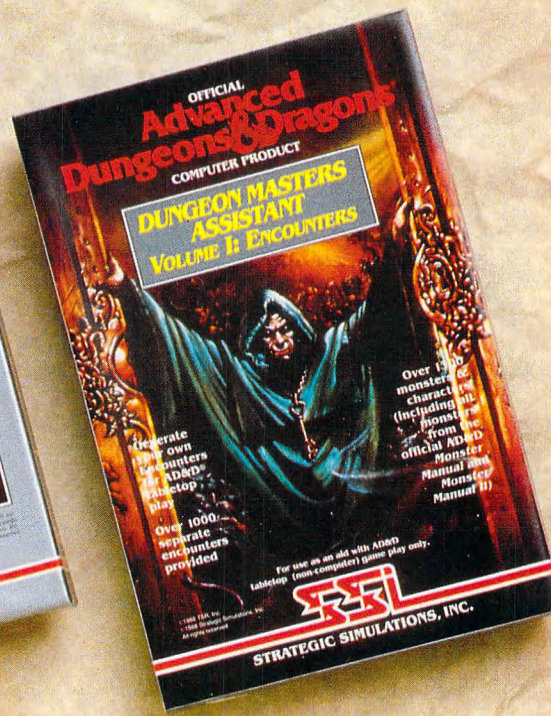
COMPUTE!'s PC Magazine
P.O. BOX 10767
DES MOINES, IOWA 50347-0767

Advanced Dungeons & Dragons®

COMPUTER PRODUCTS







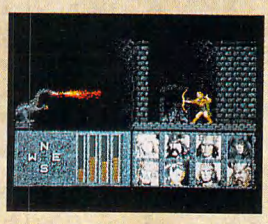
Role-Playing

POOL OF RADIANCE fulfills all your gaming fantasies. The legendary ADVANCED DUNGEONS & DRAGONS® role-playing system springs to life on your computer! Embark on dangerous quests in the magical FORGOTTEN REALMS™ game world — made incredibly real by advanced computer animation and combat that adheres strictly to AD&D® game standards. Prepare yourself for the ultimate fantasy role-playing experience!

IBM
APPLE
C-64/128

Action

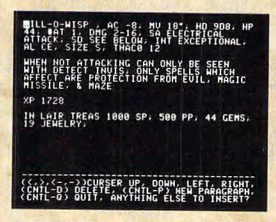
HEROES OF THE LANCE gives you non-stop excitement and fully animated action on the mystical DRAGONLANCE® game world. Guide eight Companions, each with different skills, deep into the treacherous ruins of the temple Xak Tsaroth. They will need all of your skills to help them survive the attacks of giant spiders, demons, dragons and countless other terrors. Retrieve the precious Disks of Mishakal if you can!



IBM
C-64/128
AMIGA
ATARI ST

Utility

DUNGEON MASTERS ASSISTANT, VOLUME I: ENCOUNTERS is a utility program designed to help Dungeon Masters generate encounters for AD&D® campaigns. It provides more than 1000 encounters, and over 1300 monsters and characters, including all of the monsters found in AD&D® *Monster Manuals I & II*. DMs can modify the existing data and add original monsters and encounters to the database.



IBM
APPLE
C-64/128

ADVANCED DUNGEONS & DRAGONS, AD&D, FORGOTTEN REALMS and DRAGONLANCE are trademarks owned by and used under license from TSR, Inc.
©1988 TSR, Inc. ©1988 Strategic Simulations, Inc. All rights reserved.

How To Order: Visit your retailer or call 1-800-245-4525. To receive SSI's complete product catalog, please send $1.00 to: Strategic Simulations, Inc., 1046 N. Rengstorff Avenue, Mountain View, CA 94043.

STRATEGIC SIMULATIONS, INC.

[LUCASFILM ON THE ART AND SCIENCE OF ENTERTAINMENT.]

COMBAT FLYING IS PURE SCIENCE. UNTIL THE ENEMY SHOWS UP.

IF YOU'VE EVER FLOWN a PC, you know how it can simulate every nuance of an airplane's performance envelope. And if you concentrate hard enough on the instruments, you'll soon learn what the limits are.

But when you're making a torpedo run at an enemy flattop, with flak blowing by your canopy and two Zeroes chewing up your tail, all that goes out the window. And you learn to fly by the seat of your pants.

That's the idea behind *Battlehawks 1942*,™ the new WWII naval air combat simulator from Lucasfilm Games. Besides the intellectual challenge of mastering six classic carrier planes, you get the white-hot rush of diving into some very hairy situations.

"My first burst of tracers skimmed the Val's tail. Just as I corrected my aim, he dove. I stuck like glue to his plane, taking it apart by bits and pieces. Suddenly, he pulled up and bailed through the shattered canopy. Moments later, the Val exploded..."

RELIVE HISTORY. OR REWRITE IT.

Battlehawks 1942 gives you an authentic pilot's eye view — from both sides — of four battles that turned the tide in the Pacific. As an American carrier pilot, you'll fly Wildcat fighters, Dauntless dive bombers and Avenger torpedo bombers. From the Japanese side, you'll fly Zeroes, Vals and Kates.

You'll tighten up your combat skills in a dozen training missions, then fly more than 30 real ones, from the Coral Sea to the Santa Cruz Islands.

EVEN THE THEORY IS REAL.

The technical detail and historical depth of *Battlehawks 1942* are bound to satisfy the most hard-core simulation buffs. Everything has been exhaustively researched, right down to the optimum airspeed and attack angle for dropping torpedoes.

"In early 1942, American planes were no match for my Zero. I was a hawk in a flock of geese — soaring, looping, pouncing, destroying. I was truly saddened for the brave men in those sluggish planes. All too soon, the planes got better..."

1942 feel like the real thing. To a man, they said make it *intense*.

So instead of polygon-block graphics, we use high-resolution, digitally-rendered images. Ships and planes look almost photographic. Bombs and torpedoes explode in infernos of flames and smoke. The feeling, as one veteran pilot put it, is like flying into a beehive.

Bombing a moving ship half a mile below, diving at 250 mph and dodging flak, can be a little tricky.

Your Wildcat's heavier armor and guns win in a shootout, but watch out if a Zero gets on your tail.

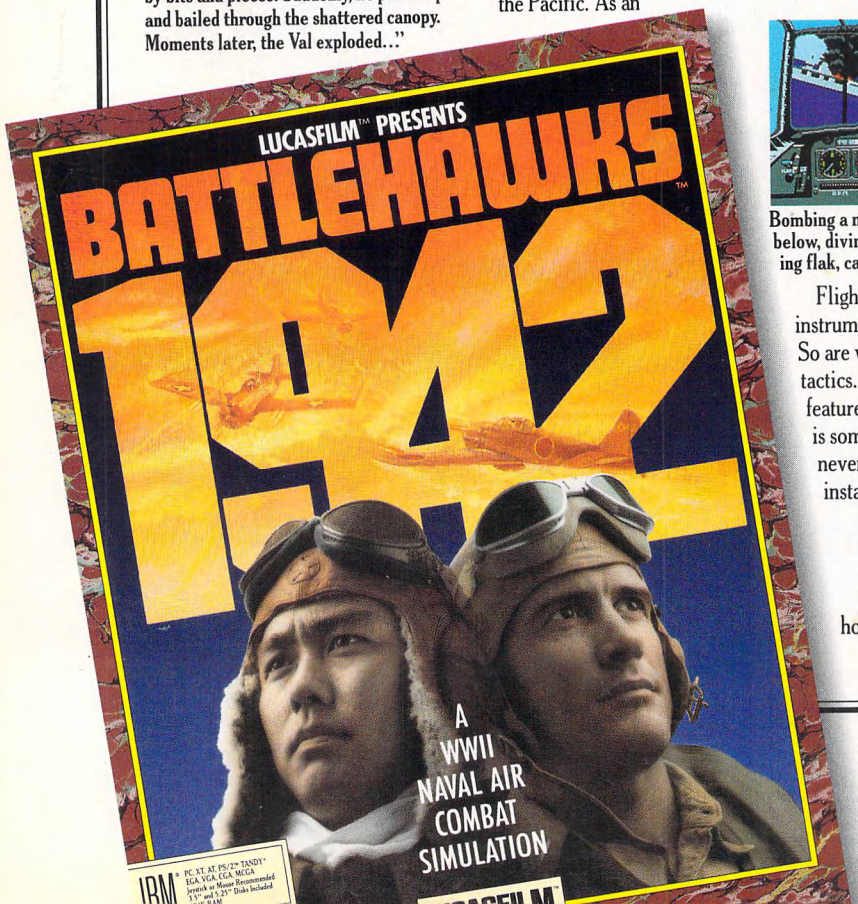
Flight characteristics and instruments are authentic. So are weapons and enemy tactics. About the only feature that isn't authentic is something combat pilots never dreamed of. An instant replay camera.

GROUND SCHOOL IT ISN'T.

We asked WWII pilots how to make *Battlehawks 1942* feel like the real thing. To a man, they said make it *intense*.

And that's where the science leaves off, and the fun starts.

LUCASFILM™ GAMES


LUCASFILM™ PRESENTS
BATTLEHAWKS 1942™
A WWII NAVAL AIR COMBAT SIMULATION
IBM® PC, XT, AT, PS/2™, TANDY® EGA, VGA, CGA, MCGA Joystick or Mouse Recommended 3.5" and 5.25" Disks Included

Battlehawks 1942 is available for IBM and close compatibles. Amiga and Atari ST versions will be available in early 1989. IBM is a trademark of International Business Machines, Inc. Atari ST is a trademark of Atari Corp. Amiga is a trademark of Commodore Electronics Ltd. All elements of the game fantasy are trademarks of Lucasfilm Ltd. ™ *& ©1988 Lucasfilm Ltd. All rights reserved.*